

RCRA CLOSURE PLAN-PART I
for the FORMER STORAGE AREA
at the SOUTH AIRPORT AREA

Pratt & Whitney
A United Technologies Company
East Hartford, Connecticut

RCRA RECORDS CENTER
FACILITY Pratt & Whitney Main St
I.D. NO. CTL990672071
FILE LOC. R-1B
OTHER RDMS# 1169

October 1997

PREPARED FOR:

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Department of Environmental Protection
Waste Management Bureau
Waste Engineering and Enforcement Division
79 Elm Street
Hartford, Connecticut 06106-5127

Attn: George Dews, Supervising Sanitary Engineer

**RE: Former Storage Area Closure Plan - Part 1
Pratt & Whitney, East Hartford, Connecticut**

November 19, 1997

Dear Mr. Dews:

Enclosed please find the RCRA Closure Plan - Part 1 for the Former Storage Area, a one-time soil stockpile area, at the South Airport Area of the Pratt & Whitney (P&W) Main Street East Hartford facility. This Closure Plan is submitted pursuant to the requirements of 22a-449(c)-105 of the Connecticut Hazardous Waste Management Regulations and Title 40 of the Code of Federal Regulations Part 265.

This Closure Plan - Part 1 has been submitted in the three-part format of Connecticut's "Draft" RCRA Closure Plan Guidance. Due to our desire to complete the closure of this regulated unit in the most expedient manner possible, P&W will be implementing the unit characterization work plan outlined in this plan immediately. We understand that immediate implementation without prior review and approval of the Department of Environmental Protection (DEP) places the work at "risk" of future comment from the DEP. We believe that the Closure Plan address all the necessary requirements and that the immediate implementation is necessary.

If you have any questions or comments regarding this information, please contact me at (860) 565-7380.

Sincerely,

Troy Charlton
Manager, Environmental Engineering
Group Environment, Health & Safety

pc: Juan Perez, EPA
Thomas J. Salimeno, LEA

**RCRA CLOSURE PLAN-PART 1
FOR THE
FORMER STORAGE AREA
(ONE-TIME SOIL STOCKPILE)
AT THE
SOUTH AIRPORT AREA
PRATT & WHITNEY
East Hartford, Connecticut
EPA ID No. CTD990672081**

**October 1992
Revised October 1997**

Prepared for:

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ACRONYMS

AEL	Averill Environmental Laboratory, Inc.
AST	Aboveground Storage Tank
BZ	Benzene
CFR	Code of Federal Regulations
CWS&TF	Centralized Waste Storage & Transfer Facility
11DCE	1,1-Dichloroethylene
12DCE	1,2-Dichloroethylene
DEP	State of Connecticut Department of Environmental Protection
EBZ	Ethylbenzene
ECM	Electrochemical Machining
ELUR	Environmental Land Use Restriction
EPA	United States Environmental Protection Agency
GBPMC	GB Pollutant Mobility Criteria
GC	Gas Chromatograph
GWPC	Groundwater Protection Criteria
H&A	Haley and Aldrich, Inc
LEA	Loureiro Engineering Associates, P.C.
MDC	Metropolitan District Commission
NGVD 29	National Geodetic Vertical Datum of 1929
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PETG	Polyethylene Terephthalate Copolyester
PID	Photoionization Detector
PVC	Polyvinyl Chloride
P&W	Pratt & Whitney
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RCSA	Regulations of Connecticut State Agencies
RDEC	Residential Direct Exposure Criteria
RSR	Remediation Standard Regulation
RVC	Residential Volatilization Criteria
SOP	Standard Operating Procedure
SPLP	Synthetic Precipitation Leaching Procedure

ACRONYMS (Cont'd)

SVOCs	Semivolatile Organic Compounds
SWPC	Surface Water Protection Criteria
TPH	Total Petroleum Hydrocarbons
TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TL	Toluene
UST	Underground Storage Tank
USGS	United States Geologic Survey
UTRC	United Technologies Research Center
VOCs	Volatile Organic Compounds
XYL	Xylenes

UNITS

cm/sec	centimeters per second
ft	feet
gpm	gallons per minute
$\mu\text{g/kg}$	micrograms per kilogram
mg/kg	milligrams per kilogram
$\mu\text{g/l}$	micrograms per liter
mg/l	milligrams per liter

1. FACILITY INFORMATION

1.1 Introduction

The purpose of this Closure Plan is to address the requirements of the Resource Conservation and Recovery Act (RCRA) regulations contained in Title 40 of the Code of Federal Regulations (CFR) Part 265 Subparts G and L and the Hazardous Waste Management Regulations contained in the Regulations of Connecticut State Agencies (RCSA) Section 22a-449(c)-105 as they pertain to the closure of an interim status hazardous waste management unit at the Pratt & Whitney (P&W) facility located at 400 Main Street in East Hartford, Connecticut. This Closure Plan is a complete revision of the Closure Plan dated October 1992 that had previously been submitted to the Connecticut Department of Environmental Protection (DEP).

This Closure Plan addresses the closure of the Former Storage Area, a one-time, temporary soil stockpile area, at the P&W East Hartford facility. Contaminated soil excavated during the removal of underground storage tanks (USTs) was temporarily stored in an area south of Rentschler Airport. The UST removals took place between January and April 1989 with contaminated soil generated during the removal activities stockpiled for approximately six months prior to being transported off the site for disposal. P&W plans to complete clean closure of the Former Storage Area prior to the sale or transfer of the property. Accordingly, P&W plans to conduct a soil sampling and analysis program focused on the constituents of concern and possible exposure pathways discussed in this Closure Plan to support the clean closure of this unit.

This Closure Plan describes the procedures to be followed to close the interim status hazardous waste management unit in a manner that:

- Eliminates the need for further maintenance.
- Controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere.
- Complies with the federal closure requirements of 40 CFR Part 265 Subpart G and L including, but not limited to, the requirements of 40 CFR 265.197.

- Complies with the Hazardous Waste Management Regulations contained in the Regulations of Connecticut State Agencies including, but not limited to, the requirements of Section 22a-449(c)-105 concerning closure.

Subsequent sections of this Closure Plan provide relevant facility information and a unit characterization work plan for the Former Storage Area in accordance with the applicable requirements contained in the “RCRA Closure Plan Guidance - Container Storage Areas and Tank Systems” (Draft), dated November 1993 and prepared by the DEP.

1.2 Facility Description

1.2.1 Facility Operations

The P&W Main Street facility is located on over 1,100 acres with over 6.5 million square feet of floor area for manufacturing, research, office space, and space for related activities and support services. The facility has been used for the manufacture of aircraft engines and aircraft engine components since December 1929. Operations at the facility include (or have included in the past) metal parts machining, vapor degreasing, chemical etching, cleaning, electroplating, painting, assembly and testing, and research operations. The facility also includes an airport and associated operations, as well as a large area (known as the Klondike Area) that was utilized for research and development activities.

The Main Street plant is bordered on the north by a residential neighborhood and Silver Lane, on the south by Brewer Street, on the west by Main Street and a residential area, and on the east by a residential area and Penney High School. A topographic map of the site was prepared from portions of the Glastonbury, Hartford-North, Hartford-South, and the Manchester United States Geologic Survey (USGS) 7.5 minute topographic maps and is included as Figure 1. A site plan of the entire facility is provided as Figure 2.

Willow Brook runs through the north end of the complex in an east to west direction toward the Connecticut River. The brook is dammed and ponded in the vicinity of the Centralized Waste Storage & Transfer Facility (CWS&TF). The United Technologies Research Center (UTRC) (EPA ID No. CTD095532131) is located on the north central border of the Main Street plant and does not constitute part of the Main Street facility.

1.2.2 Waste Management Operations

The Main Street facility is involved in the manufacture, development, and testing of jet engines and jet engine components. Materials and processes used in these operations generate or have generated large quantities of wastes. These wastes include or have included industrial wastewaters, dilute oily wastes, characteristic hazardous wastes (ignitable, corrosive, reactive, and Toxicity Characteristic Leaching Procedure (TCLP) Toxic) and listed hazardous wastes (e.g., spent solvents).

P&W also utilizes or has utilized a wide variety of products that are hazardous wastes such as acids, alkalies, cyanides, alcohols, metal plating solutions, specialty solutions, fungicides, epoxy, cleaners, resins, paints, solvents, fuels, and many commercial chemical products listed in 40 CFR 261.33(e) and (f). Polychlorinated Biphenyl (PCB) wastes have also been generated on the site.

Specific processes which use the above products and which result in the generation of hazardous wastes include or have included the processes listed below. Note that processes followed by an asterisk (*) have virtually been eliminated from the site based on present operations.

- Product rinsing, stripping, cleaning, degreasing, alkali and acid cleaning, vapor degreasing*, salt bath descaling.
- Electroplating, etching, plating, anodizing, heat treating, electroless plating, painting operations, acid treatment (pickling), chromate conversion coatings*.
- Abrasive jet machining, chemical machining, electrochemical machining* (ECM), electrical discharge machining, general machining.
- X-ray testing, fluorescent penetrant inspection, magnetic penetrant inspection, photo developing.
- Sludge removal, solvent reclamation*, battery replacement, spill cleanup, process decontamination, cleaning fuel systems, remediation and decommissioning activities, removal of obsolete materials, machine oil changes, general maintenance and housekeeping activities.

The waste management operations at the Former Storage Area involved only the storage of contaminated soil in waste piles. The contaminated soil was the result of the closure and removal of USTs. Some of soils stored within the area were contaminated with the following: tetrachloroethylene (PCE), 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), toluene (TL), and xylene (XYL). In accordance with 40 CFR 261.33(d), the excavated soils containing spill

residues contaminated with specific unused commercial chemical products are classified as “U-listed” hazardous wastes.

1.3 Environmental Setting

1.3.1 Land Use

The property within a 1,000-foot distance surrounding the facility is zoned for residential, business, and industrial use. An excerpt from the Town of East Hartford Zoning Map, showing the facility and the surrounding area, is included as Figure 3.

1.3.2 Groundwater Classification

The DEP has adopted water quality classifications for the groundwaters and surface waters of the state to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term state goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP.

The groundwaters beneath the entire facility, including the Former Storage Area, have been classified by the DEP as GB. A classification of GB indicates groundwaters within highly urbanized areas or intense industrial activity and where a public water supply is available. Figure 4 depicts the groundwater classification of the site and is based on the map “Adopted Water Classifications for the Connecticut River Basin” prepared by the DEP and dated June 1988. This map is also based on maps supplied to the DEP during a recent groundwater reclassification petition and reflects the current groundwater classification.

The surface water classification of the Connecticut River in the area of the facility is SC/SB, denoting a surface water goal of SB (suitable to receive cooling water discharges and discharges from municipal and industrial wastewater treatment systems). Willow Brook on the northern portion of the facility is classified as a B stream. Pewterpot Brook on the southern portion of the facility in the vicinity of the Former Storage Area is classified as an A stream.

1.3.3 Drinking Water Supplies

A review of the “Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut” published by the DEP and dated June 1982 identified only two water supplies within a 1,000-foot

radius of the facility. These two wells, located at the Main Street facility, were properly abandoned in August 1996 and have not been used since the late 1980s due to low demand.

Loureiro Engineering Associates, P. C. (LEA) has reviewed the records available at the Town of East Hartford. No public or private water wells were found during the record search within a 0.25 mile radius of the facility. However, a private well is known to exist on a four-acre residential parcel surrounded by the South Klondike Area (364 Brewer St., shown on Figure 2 as a shaded area near the southeastern corner of the Airport). P&W is in the process of abandoning this well and installing a connection to the Metropolitan District Commission (MDC) public water supply as part of the groundwater reclassification for the area. In June 1996, P&W submitted a groundwater reclassification petition to the DEP in order to reclassify this area from GA to GB. The petition was subsequently approved in August 1996 by the DEP.

A review of MDC records, which was also undertaken at the time of the records search, indicated that the facility and its surroundings are served by the MDC's public water supply. However, a house to house survey has not been performed to confirm these findings.

Potable water is presently supplied to the facility and greater East Hartford by the MDC of Hartford County. The closest public well fields are located in South Windsor, Manchester and Glastonbury, about 5 to 5.5 miles northeast, east and southeast of the site, respectively.

1.3.4 Floodplain Information

The surface water bodies of importance for floodplain information on this site are Willow Brook on the northern side of the site near the main facility and Pewterpot Brook, associated tributaries, and wetlands on the southeastern part of the site. Near the main plant, the 100-year flood level is 33.3 feet and is located within the Willow Brook Pond embankments. The 500-year flood level is 36.1 feet which would also be contained within the pond. Figure 5 shows the 100- and 500-year flood boundaries for Pewterpot Brook and the unnamed tributary to Pewterpot Brook as taken from the Flood Insurance Rate Maps for the Town of East Hartford, Connecticut. Part of the southern portion of the Rentschler Airport and Eastern Klondike are within the 100- and 500-year floodplain. The Former Storage Area is not within either the 100- or the 500-year floodplain.

1.3.5 Geology/Hydrogeology

1.3.5.1 Regional Geology

The P&W Main Street facility lies in the Central Lowlands province of Connecticut, a north-south trending valley system which is approximately twenty miles wide at East Hartford. The lowland consists of a series of parallel valleys separated by linear north-south trending ridges. The Connecticut River flows southward approximately one mile west of the site, draining the northern part of the valley system. The river has created a broad floodplain and eroded terraces in the flatter portion of the valley system.

The unconsolidated sediments in the region were deposited during and following, the most recent period of glaciation, which ended approximately 10,000 years ago. These materials can be divided into three major units: glacial till and ice-contact stratified sediments, glaciolacustrine deposits, and post-glacial fluvial and eolian (wind-blown) deposits. The three units were deposited in the order noted above, with the till and ice-contact sediments generally lying directly over bedrock.

The till is poorly sorted and varies widely from a non-compact mixture of sand, silt, gravel, and cobbles, with trace amounts of clay, to a compact mixture of silt and clay with some sand, gravel, and cobbles. Locally, units consisting of sand and gravel deposited in contact with the ice are present beneath the glaciolacustrine sediments. Glaciolacustrine materials consist of both silt and clay deposited in a glacial lake and sand and gravel deposits formed by beaches and deltas in the lake. These materials may be as much as 270 feet thick in the vicinity of the site.

Post-glacial fluvial sediments consist of sand and silt deposited as the Connecticut River flowed across the exposed deposits of the former lakebed and cut stream terraces into the exposed lacustrine clays and silts. These stream terraces are laterally extensive in the vicinity of the site, and are typically fifteen to thirty feet thick. In addition, a thin veneer of eolian sediments was deposited over parts of the area. These deposits typically consist of yellowish-brown fine- to medium-grained sand and silt. These deposits are only locally important.

The bedrock geology of the region consists of sedimentary and igneous rocks. The bedrock stratigraphy consists of four sedimentary rock formations: the New Haven Arkose and the Shuttle Meadow, East Berlin, and Portland Formations, which are separated by interbedded, laterally continuous basalt flows. The sedimentary units are composed predominantly of interlayered gray or reddish siltstones, sandstones, and conglomerates. The bedrock layers dip to

the southeast at approximately ten to forty-five degrees towards the Eastern Border fault, which is located approximately eight to nine miles east of the site.

1.3.5.2 Site Geology

Post-glaciolacustrine fluvial deposits occur across the site and generally range from fifteen to thirty feet in thickness, increasing in thickness toward the central part of the site where greater erosion of the top of the glaciolacustrine silt and clay may have occurred along an ancient channel of the Connecticut River. These deposits generally consist of uniform brown fine or fine to medium sand. Recent laminated silt and sand alluvium occurs near the western boundary of the site closest to the present course of the Connecticut River. This alluvium is thickest near the Connecticut River and likely interfingers with the older stream terrace deposits. Other recent alluvial deposits are found scattered across the site near existing and former streams (e.g., Willow Brook) or wetland areas.

Glaciolacustrine lake bottom sediments occur over most of the site and range up to 270 feet in thickness. These deposits thicken towards the central part of the site (near the main factory complex) and are generally absent near the eastern boundary of the site (the Klondike Area). These deposits consist of laminated (varved) silts and clays with red fine sand partings. The color varies from grey near the surface to red at the base of the unit.

Beneath the eastern portion of the site, the contact between the silt and clay and overlying post-glacial sediments is distinct. However, in the vicinity of the main factory complex, an intermediate layer of fine sand and silt that varies from approximately five to twenty feet thick occurs between these two deposits. A similar zone may occur at the base of the glaciolacustrine unit as well.

Investigations on the site have indicated that local sand or gravel lenses of glaciofluvial origin are present within the glaciolacustrine unit near its base. However, these lenses do not appear to be laterally extensive.

A layer of glacial till, up to ten feet thick, typically directly overlies bedrock beneath the site. However, a gravelly sand ice-contact stratified drift deposit has been documented above or in place of the till in a few isolated instances.

Bedrock beneath the site consists of red sandstone and siltstone of the Portland Formation. Depth to bedrock within the study area is over 300 feet in the area of the main factory complex,

and approximately 30 feet along the eastern property boundary in the Klondike Area (except at one location, where bedrock was encountered at about 12 feet). Near the Connecticut River (west of the site), depth to bedrock is about 150 feet. A north-south trending buried bedrock valley underlies the main factory complex. This buried valley may have been a pre-glacial channel of the Connecticut River.

1.3.5.3 Regional Hydrogeology

The P&W Main Street facility is located within the Upper Connecticut River Regional Drainage Basin. Regional flow in this part of the basin is expected to be toward the Connecticut River to the west, although local groundwater flow would be controlled by local geologic conditions and anthropogenic features, such as production wells.

There are four distinct saturated hydrogeologic units in the shallow subsurface within the region (from uppermost to lowest): (1) glaciolacustrine silt and sand deposits and post-glacial fluvial deposits; (2) glaciolacustrine clay and silt deposits; (3) till and ice-contact stratified sediments; and (4) sedimentary bedrock (the Portland Formation).

The post-glacial fluvial deposits comprise the majority of the upper aquifer and generally constitute the most important aquifer in the region, primarily due to the saturated thickness and extent. The unconfined aquifer is relatively coarse-grained and supplies much of the groundwater used for municipal and industrial purposes in the region.

The majority of the glaciolacustrine deposits are comprised of silt and clay. These sediments have low permeability and function as a confining layer. The glaciolacustrine unit also includes limited sand and gravel lenses and areas of sandy beach and deltaic deposits. These deposits may be locally important as aquifers, but are of limited areal extent.

Glacial till is generally thin and discontinuous, poorly sorted, and contains large amounts of silt and clay, although sandy zones exist. This unit is usually a poor aquifer and is rarely used even for domestic production. Ice-contact stratified sediments beneath the silt and clay layer may be coarse-grained and capable of producing large amounts of water, but these deposits are not laterally extensive and are therefore only locally important.

The Portland Formation consists of southeastward-dipping, well-cemented beds of sandstone and siltstone. Groundwater flow in the bedrock is primarily within fractured and faulted zones. The

Portland Formation is an important source of water for domestic use, but yield is generally not sufficient for large-scale users.

1.3.5.4 Site Hydrogeology

The upper zone of the unconsolidated aquifer, which occurs within the stream terrace and glaciolacustrine silt and sand deposits, is the aquifer zone of greatest interest because of the shallow occurrence of economic quantities of groundwater for use, its proximity to potential sources of contamination, and its interconnection with surface water systems. The uppermost zone of this unit is largely composed of well-sorted medium to fine sand, with a saturated thickness generally ranging from ten to twenty feet. Saturated thicknesses are generally greater towards the center of the site where the stream terrace deposits thicken, and lesser in the eastern portion of the site (the Klondike Area) where bedrock approaches the ground surface.

Water-level measurements collected in February 1991 indicated that groundwater within the upper aquifer generally flows from east to west across the site, toward the Connecticut River. Groundwater was expected to also flow locally toward Willow and Pewterpot Brooks, which cross the site. However, the monitoring well coverage prohibited further evaluation of the locations of local groundwater flow divides; the site-wide program was not designed to evaluate these local divides.

The depth to water in the upper zone of the unconsolidated aquifer ranges from approximately one to thirteen feet below grade. Groundwater flow gradients in this aquifer are quite variable across the site, but are generally gentler in the central portion and steeper in the eastern portion (the Klondike Area) and the western portion (closer to the Connecticut River).

The upper aquifer provided large volumes of water to the numerous on-site production and dewatering wells. Five production wells were installed within or adjacent to the main facility buildings in 1941. Only three of these wells are currently in operation for dewatering purposes; PW-03 is no longer in operation, and PW-05 have been abandoned. Thirteen additional production wells were installed in the South Airport Area and Main Plant Area between 1942 and 1954. Historically, these wells were used as a source of potable water and process water. In 1983, one of those wells was replaced. These wells are no longer being used.

In 1966, the combined yield of these production wells was as high as 850 gallons per minute (gpm). Total pumpage at the plant, including the basement dewatering network during the most

recent water well observation period, was approximately 535 gpm. During that event, combined yield of the current basement dewatering network was measured at approximately 235 gpm.

The glaciolacustrine deposits under the site consist almost entirely of lake bottom silt and clay, and are considered to be a confining unit, or aquitard, inhibiting downward flow from the upper aquifer throughout most of the site. This consideration is due to the fact that these sediments are composited of finely-laminated silt and clay, can be up to 270 feet thick, and are laterally extensive. A slug permeability test conducted in 1990 on a well screened within this unit indicated a horizontal hydraulic conductivity of 2.3×10^{-6} centimeters per second (cm/sec) or 6.5×10^{-3} feet per day.

The glacial till and ice-contact stratified sediments form a thin, discontinuous layer directly above the bedrock and, therefore, represent a relatively insignificant hydrogeologic unit. P&W previously operated a production well, which drew water from a gravelly deposit overlying bedrock (This well was initially completed in bedrock; however, due to low yield, the bedrock portion of the well was backfilled with sand). This deep overburden well likely withdrew water from an ice-contact stratified drift deposit or from a relatively sandy zone within the glacial till.

The bedrock aquifer is not currently used by P&W for water supply, although it has been in the past. Three wells (DW-01, DW-02, and #32) were drilled into the bedrock; but only one (DW-01) was used as a bedrock production well. This well was completed in bedrock and yielded approximately 220 gpm on a continual basis from 1939 until about 1966. The portion of this well below the stream terrace deposits was subsequently filled in, when the pump shaft broke within bedrock. The well was then screened within the stream terrace deposits. Wells DW-01 and DW-02 were abandoned in August 1996. Very limited information is available on water levels or groundwater flow in bedrock beneath the site.

Groundwater flow in the vicinity of the site generally follows the direction of regional flow, westerly to the Connecticut River. However, the local groundwater flow direction may be influenced by various factors. One such factor is the interaction between local surface water bodies and the groundwater system; a second factor is the influence of manmade features (e.g., utilities). Groundwater flow patterns indicate that the local surface water drainage systems, consisting of Willow Brook, Pewterpot Brook, and their respective tributaries, likely act as groundwater discharge points.

Pewterpot Brook and its tributaries drain the majority of the eastern and southern portions of the property. The first tributary, the Klondike Tributary, flows within a dug ditch which runs north-south, adjacent to the airport perimeter road, parallel to the easternmost runway. The second major tributary, the Suntan Tributary, to Pewterpot Brook runs northeast-southwest and crosses the South Airport Area in a buried culvert. This tributary emerges from the culvert at a small pond which was originally excavated in an effort to increase yields for the adjacent production wells in the South Airport Area.

Previous measurements of baseflow in Pewterpot Brook and its tributaries made in January 1991 indicated the likelihood that these streams serve as groundwater discharge areas. In the most recent water level data set, surface water elevations were typically lower than nearby groundwater levels, further suggesting that the majority of the Pewterpot Brook system serves as a groundwater discharge region. The normal westerly groundwater flow pattern is modified by apparent discharge to Klondike Tributary and Suntan Tributary on the western edge of the Klondike. Production wells on both sides of the lower reaches of Suntan Tributary, probably acted to artificially lower local groundwater elevations.

Willow Brook also appears to serve as a groundwater discharge area. Surface water elevations at the UTRC property, where Willow Brook enters a culvert, were slightly lower than surrounding groundwater elevations, indicating groundwater discharge to the brook. Willow Brook re-emerges approximately 3,000 feet to the southwest at Willow Brook Pond. In the vicinity of the pond, water level data indicate a surface water elevation higher than local groundwater elevations. Groundwater is likely artificially recharged to some extent by the ponding of the brook here.

In the vicinity of the Former Storage Area, the groundwater occurs approximately eight to eleven feet below ground surface and generally flows west from the Former Storage Area towards Pewterpot Brook. Horizontal flow gradients in the stream terrace deposits (i.e., upper aquifer) in the vicinity of the Former Storage Area are on the order of from 0.002 to 0.01 feet per foot with considerable localized variability.

1.3.6 Surface Water Drainage

Local topography in the vicinity of the Former Storage Area is generally flat. Surface water runoff on the site is generally toward local surface waters, based on the site topography. Much of the site shows little topographic relief. The Klondike Area in the eastern portion of the facility

ranges from an elevation of about 50 to 60 feet above mean sea level NGVD¹ sloping westward toward the airport at about 1 percent. The central (airport) portion of the site is generally flat, with slopes less than 0.5 percent, ranging between elevation 38 in the southern part to elevation 48 in the northern part. The manufacturing complex area generally ranges from elevation 36 to 40. The northern portion of the site contains Willow Brook and Willow Brook Pond.

Most of the portion of Willow Brook upstream of Willow Brook Pond flows in an underground culvert. Beyond the pond, Willow Brook flows generally westward, and empties into the Connecticut River adjacent to the Colt St. Facility. The Pewterpot Brook and an unnamed tributary flow in a westerly-southwesterly direction in the southern part of the Rentschler Airport. The southern part of the Rentschler Airport and eastern part of Klondike are within the inland wetlands area and associated buffer zone.

1.4 Description of the Regulated Unit

Contaminated soils generated during the removal of USTs from the North, South, and Experimental Test Areas at the P&W Main Street facility were accumulated in the Former Storage Area and consisted of five stockpiles for temporary on-site storage. The Former Storage Area, used for the one-time temporary stockpiling of contaminated soil, was located in the South Airport Area and covered an approximately 40 feet by 120 feet area as shown on Figure 6. Only two of the five piles (designated Soil Pile Nos. 1 and 2) were used for storage of soil that contained hazardous waste (i.e., U210, U220, U226, U228, and U239). However, the exact storage location of these two piles of soil containing hazardous waste within the area covered by all five soil piles is unknown. Therefore, the entire 40 foot by 120 foot temporary, soil storage area, identified as the Former Storage Area, is addressed in this Closure Plan. Appendix A includes background information on the Former Storage Area including DEP correspondence regarding the classification and disposal options for the soil contained in Soil Pile Nos. 1 and 2. Sketches of the former soil piles are also included in Appendix A.

On January 17, 1989, four USTs were removed from the North Test Area (formerly called the North Tank Farm) at the P&W facility. Two of the tanks had held virgin TCA and two had held virgin PCE. The capacity of each of the tanks was 10,000 gallons. Soil contamination was noted during the tank removal operations. The DEP Oil and Chemical Spill Section was notified at that time, and immediate remedial actions were performed by excavating and stockpiling the contaminated material on the site.

¹ National Geodetic Vertical Datum of 1929

In addition to the solvent USTs, there were other numerous USTs in the North Tank Farm. Appendix B includes background information on the former tank locations and provides a tank inventory. From January to February 1989, fifteen 10,000-gallon steel tanks were removed from the tank farm. During these tank removal operations, additional soil contamination was noted and removed. These tanks had held petroleum-based fuels and lubricating products. The contaminated soil noted during this tank removal operation was excavated and placed in the soil stockpiles of the Former Storage Area in the South Airport Area.

From March 1989 to April 1989, eleven tanks were removed from the South Test Area (formerly called the South Tank Farm). In April 1989, three tanks were removed from the Experimental Test Area (formerly called the Experimental Tank Farm). An unknown quantity of jet fuel had apparently leaked from several of these tanks systems. Constituents of jet fuel were detected in soil samples collected from each of these tank farms, and were attributed to tank overfills and underground piping leaks. This contaminated soil was excavated and placed in the soil stockpiles of the Former Storage Area in the South Airport Area.

Throughout the tank removal operations, a soil sampling and analysis program was conducted in order to identify and delineate the extent of any contamination. This program enabled the on-site personnel to better delineate the limits of required soil removal activities.

Five soil stockpile in the Former Storage Area were constructed in the South Airport Area, to contain the contaminated soil from the UST removals. The soil was segregated based on the type and relative degree of contamination and not the tank farm where it originated. Each soil pile was located in a bermed area, lined and covered with six-millimeter polyethylene sheeting. The volumes of soils ultimately placed in each of the five stockpiles are listed below:

- Soil Pile No. 1 300 cubic yards
- Soil Pile No. 2 400 cubic yards
- Soil Pile No. 3 200 cubic yards
- Soil Pile No. 4 700 cubic yards
- Soil Pile No. 5 350 cubic yards

The total volume of 1950 cubic yards of soil could be considered the maximum waste inventory which could be present, even though there are no hazardous wastes currently stored in the Former Storage Area. The total volume of soil stored in the Former Storage Area also includes a larger volume of soils that were identified as non-hazardous waste.

Analytical results for soil samples from Soil Pile Nos. 3, 4, and 5 were submitted to the DEP Solid Waste Management Unit. This soil was characterized as non-hazardous waste and the Solid Waste Management Unit granted approval for the disposal at the East Hartford landfill. On June 19, 1989, the soil was transported to the landfill where it was used as cover material. Copies of the letters granting approval for soil disposal are included in Appendix A.

Soil Pile Nos. 1 and 2 contained the following contaminants: PCE, TCA, TCE, TL, and XYL. In accordance with 40 CFR 261.33(d), the excavated spill residues containing unused commercial chemical products are classified as "U-listed" hazardous wastes. The soil piles, containing listed hazardous waste, were stored on the site for a period of about six months prior to off-site disposal. On four days (July 12, 13, 14, and 17, 1989), 1,528,560 pounds (about 765 tons) of hazardous waste soils were hauled for disposal to a permitted disposal facility; Stablax Canada, Inc. in Blainville, Quebec.

Presently, the Former Storage Area is vacant and surrounded by a four-foot snow fence. P&W plans to complete clean closure of the Former Storage Area prior to the sale or transfer of the property. Accordingly, P&W plans to conduct a soil sampling and analysis program focused on the constituents of concern and possible exposure pathways discussed in this Closure Plan to support the clean closure.

1.5 Part A Status

P&W has filed RCRA Part A and RCRA Part B Applications (EPA ID No. CTD990672081) and a RCRA Part B Permit has been issued for hazardous waste storage at the P&W East Hartford facility. The original RCRA Part A Application for the Main Street facility was filed on November 18, 1980. At the advice of the DEP and to facilitate resolution of RCRA regulatory issues, particularly closure, the Part A Application was subsequently amended on October 15, 1993 to add the Former Storage Area (i.e., the one-time, temporary soil stockpile area). A copy of the amended Part A Application is included in Appendix C.

Several former interim status units exist at the facility and are no longer used for greater than 90-day storage of hazardous wastes. These former interim status units include CWTP-1 through CWTP-6 and the Former Storage Area at the South Airport Area. Closure plans have been submitted for all of the former interim status regulated units at the facility. These units are awaiting closure plan approval. An exception is the Burn-Zol hazardous waste incinerator which has been closed in accordance with an approved closure plan. The CWS&TF is currently the

only unit at the facility operating under a RCRA Part B Permit for greater than 90-day storage. Several of the former interim status units are currently used for less than 90-day storage. This Closure Plan only addresses the permanent closure of the Former Storage Area, a one-time, temporary soil stockpile area. The closure of all of the other regulated units at the Main Street facility is not addressed in this Closure Plan.

1.6 Other Contaminant Sources

In the vicinity of the Former Storage Area, the other potential source of contamination, which could potentially interfere with the characterization of the Former Storage Area, is the Contractor Storage Area. The Contractor Storage Area is a series of small paved lots serving as a marshaling area for P&W subcontractors. The layout of the Contractor Storage Area is also shown on Figure 6. Many of these areas were used for the storage of construction equipment and materials, mostly within storage sheds or trailers but also on the ground. As part of the subcontractors operations, these areas were used for the storage of small quantities of fuels, paints, and cleaning fluids. Small-scale painting operations were also conducted here.

2. UNIT CHARACTERIZATION WORK PLAN

2.1 Preliminary Investigations

On August 18, 1992, a soil vapor survey was performed by Haley and Aldrich, Inc. (H&A) as part of an initial evaluation of the feasibility of clean closure for the Former Storage Area. A total of fourteen soil vapor samples were collected from eleven sampling locations (SV-1 through SV-11) within the identified limits of the area. Vapor samples were collected from two depth intervals (2.5 to 3 feet and 7.5 to 8 feet below ground surface) to evaluate the vertical extent of contamination at each of the sampling locations. The soil vapor samples were analyzed for benzene (BZ), 1,1-dichloroethylene (11DCE), 1,2-dichloroethylene (12DCE), ethyl benzene (EBZ), PCE, TCA, TCE, TL, and XYL.

Low levels of VOCs with concentrations ranging from 1 to 11 parts per billion (ppb) were detected during the soil vapor survey. PCE was detected at seven of the sampling locations (SV-1 through SV-3 and SV-5 through SV-8) at concentrations from 1 to 11 ppb. TL and 12DCE were also detected at sampling location SV-1 at concentrations of 1 and 4 ppb, respectively. Information on the vapor sampling locations, the tabulated results, and sampling and analysis procedures is included in Appendix D.

On August 18 and 19, 1992, soil sampling was performed by H&A within the limits of the area. Four hand auger soil borings (SA-B-06 through SA-B-09) were advanced to a depth of five feet. The sampling locations are shown on Figure 6. Sample locations SA-B-06 and SA-B-09 were selected judgmentally to focus on unsampled portions of the area. SB-B-06 was selected based on the low levels of PCE detected in this corner of the area during the soil vapor survey. SA-B-09 was selected to provide areal coverage of the eastern portion of the area. SA-B-07 and SA-B-08 were selected randomly by gridding the area and using a random number table.

Soil samples were collected from two depth intervals (1 to 3 feet and 3 to 5 feet below the ground surface) to evaluate the vertical extent of contamination at the sampling location. All of the samples from the 1 to 3 foot interval, including a duplicate sample from SA-B-06, were selected to be analyzed. In addition, one sample from SA-B-06 from the 3 to 5 foot interval was also selected to be analyzed.

During the completion of soil sampling, a single sediment sample (SA-SD-01) was collected by H&A to evaluate the sediment quality in a nearby drainage swale. The swale, just to the south of the area, sampled would have been the discharge location for surface water drainage from the Former Storage Area. Any contaminants in surface water would have been discharged to this swale.

A total of six soil samples, including the duplicate, were submitted to Ceimic Corporation and analyzed for the presence of VOCs by EPA Method 8240 and the RCRA 8 metals plus copper, nickel, and zinc. For the VOCs, only the halogenated, nonhalogenated, and aromatic compounds included in the parameter lists for EPA Methods 8010, 8015, and 8020 were reported for the VOC analysis by EPA Method 8240. A summary of the samples collected and analyses performed for the Former Storage Area is included on Table 1.

Concentrations of constituents detected in soil samples collected for this Former Storage Area are presented on Table 2. One or more of the metals analyzed were detected in all of the soil samples submitted for analysis. These metals included arsenic, barium, cadmium, chromium, copper, lead, nickel, and zinc. Mercury, selenium, and silver were not detected in any of the samples analyzed. Except for arsenic, cadmium, and chromium, the concentrations of the metals detected in the soil samples are typical of "Walpole Soils" background concentrations for the site. Arsenic was detected at a concentration slightly above background at sample location SA-B-07. Cadmium was detected above background in all of the samples. Chromium was detected slightly above background at sample location SA-B-09. The site-specific background soil

concentrations for various inorganic constituents have been previously determined for the Klondike soils (Fuss & O'Neill, 1994).

A monitoring well (SA-MW-04) had been installed in the vicinity of the Former Storage Area as part of historic site-wide investigations. Groundwater samples were collected from this well on November 15, 1991, June 10, 1992, March 18, 1996, and September 12, 1996 and were submitted for analysis for VOCs and metals (the RCRA 8 metals plus nickel, and zinc). For the March 18, 1996 sampling event, the only parameters analyzed were VOCs. For the September 12, 1996 sampling event, the parameters analyzed also included VOCs, metals, and Total Petroleum Hydrocarbons (TPH). A summary of the samples collected and analyses performed is included on Table 1.

Concentrations of constituents detected in the groundwater samples are presented in Table 3. No VOCs were detected in the groundwater samples collected from well SA-MW-04. TPH was detected in well SA-MW-04 on September 12, 1996 at a concentration of 0.5 milligrams per liter (mg/l). Lead and zinc were detected in the well on November 15, 1991 at concentrations of 0.015 and 0.02 mg/l, respectively. Barium and zinc were detected in the well on June 10, 1992 at concentrations of 0.02 and 0.01 mg/l, respectively. Barium was detected in the well on September 12, 1996 at a concentration of 0.033 mg/l. The concentrations of barium and zinc detected in the groundwater samples, which occur naturally, are typical of background concentrations that have been observed on the site.

2.2 Constituents of Concern

The constituents of concern are all those hazardous constituents listed in 40 CFR Part 261 Appendix VIII which could be present at the Former Storage Area as residual contamination or as degradation products of residual contamination. The constituents of concern for the Former Storage Area are listed on Table 4. The inclusion of specific hazardous constituents on Table 4 was based on a review of all available information including analytical data generated during initial characterization of the soil piles and a listing of the materials stored in the USTs. Specifically, significant concentrations of the following VOCs were detected in the soil removed from these tank farms: PCE, TCE, and TCA. The materials stored in the USTs were primarily low-weight petroleum products and chlorinated solvents.

Some metals were added to Table 4 since they were present on the site as raw materials or were present in waste oils which were stored in the North Tank Farm. Also, leaded gasoline was

stored in USTs in the North Tank Farm. The eight RCRA metals along with copper, nickel, and zinc were included on Table 4.

All hazardous constituents on Table 4 are parameters that were identified by the records review and assumed to have the potential for being present at the Former Storage Area. The objective of the closure is to demonstrate that the regulated unit has not caused waste-derived hazardous constituents (listed in 40 CFR Part 261, Appendix VIII for soil) to be present in soil underlying the Former Storage Area, at concentrations above those listed in the Connecticut Remediation Standard Regulation (RSR). While some soil data exists, additional soils data is necessary to ensure that the area has been adequately characterized for the closure.

2.3 Potential Human Exposure Pathways

While the post-closure use of the Former Storage Area has not yet been determined, the closure is being undertaken prior to the sale or transfer of the property. For any potential future use, the potential human exposure pathways include ingestion of soil, ingestion of groundwater, ingestion of fish from impacted surface waters, and inhalation of volatile constituents-of-concern. In preparing this Closure Plan, the least restrictive future use with the most restrictive criteria is for residential use.

In preparing this Closure Plan, all potential exposure pathways for the constituents of concern were identified in order to be able to determine potential impacts and to aid in the development of specific media closure criteria. The media closure criteria are developed to identify the contaminant concentrations below which there is minimal risk to human health and the environment. The media closure criteria are used to define the extent of any contamination that must be remediated and to verify that any contamination has been successfully remediated. In view of the human exposure pathways for the site, the media closure criteria for the contaminants of concern at the facility directly incorporate the default numeric criteria included in the RSR. The development of the constituents of concern is discussed in Section 2.2.

Soil data will be compared to default numeric residential direct exposure criteria (RDEC), and the GB pollutant mobility criteria (GBPMC) for each of the constituents detected during the closure sampling. Groundwater concentrations will be compared to the surface water protection criteria (SWPC) and the residential volatilization criteria (RVC).

The applicable numeric criteria utilized for the media closure criteria are those criteria which have been specifically identified in Appendices A through E of the RSR. The determination of

criteria for constituents which do not have numeric criteria specifically identified in the RSR was not performed as part of this project. Although there have not been any constituents detected which do not have numeric criteria specifically identified in the RSR, the determination of criteria for constituents without default numeric values shall be performed once a particular constituent is identified and the necessary closure sampling and analyses are complete.

2.4 Investigation Methodology

There are several activities to be performed as part of this clean closure demonstration including: Geoprobe® borings and soil sampling, groundwater sampling, and the subsequent analysis of the soil and groundwater samples. These activities are presented in detail below.

2.4.1 Geoprobe® Borings

To accomplish the objectives of this investigation, a series of Geoprobe® soil borings will be performed within the limits of the Former Storage Area. Geoprobe® borings will be performed in accordance with LEA's Standard Operating Procedure (SOP) for Geoprobe® Probing and Sampling included in Appendix E. The Geoprobe® is a vehicle-mounted, hydraulically-powered, soil probing machine that utilizes the vehicle weight and percussion to advance small diameter sampling tools into the ground for collecting soil, soil gas, or groundwater samples. The primary advantages of using the Geoprobe® over conventional methods are waste minimization and mobility. Very little waste material is generated, other than excess soil (from the soil-core sampler) not placed into sampling jars. The relatively small dimensions of the vehicle-mounted Geoprobe® allows sampling in areas inaccessible to conventional drilling rigs.

2.4.2 Soil Sampling

To successfully demonstrate that the Former Storage Area does not pose a threat to human health or the environment, confirmational soil samples from within the limits of the area will be collected for analysis. The confirmational soil samples will include judgmental samples for a representation of worst-case impacts (i.e., collected based on available information about the area and visual observations) and random samples collected according to the procedure described below.

The Former Storage Area will be arbitrarily gridded and sampled at locations corresponding to randomly selected grid nodes. The judgmental locations will be based on knowledge of historical data for the area. The judgmental sample locations will identify worst-case conditions.

The soil samples will be collected from soil borings located according to the procedure described below.

Random sample locations will be based on randomly selected grid nodes. The size of the grid interval will be determined by the equation:

$$GI = (A/3.14)^{0.5}/2, \text{ where,}$$

GI = grid interval, feet
A = area to be gridded, square feet

The number of random sample locations to be obtained from the area will be arbitrarily determined by calculating the nearest integer value of the square root of the number of grid nodes. A random number table will be used to determine which grid nodes will be sampled. The calculation of the number of random confirmational sample locations to be collected from the Former Storage Area results in a total of five random sample locations. In addition to the random samples, three judgmental samples will be collected from the area. To ensure that an adequate number of samples are taken to characterize the media for statistical validity, the statistical methods contained in *"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods"*, EPA Publication SW-846, 3rd Edition will be utilized upon receipt of the analytical results.

The borings will be advanced using LEA's Geoprobe® in accordance with the LEA SOP as mentioned previously. Soil samples will be collected in two-foot intervals from each boring using the large-bore or macro-core sampler. The macro-core sampler system is a four-foot long, two-inch diameter, stainless steel sampling tube which uses a polyethylene terephthalate copolyester (PETG) liner to collect a continuous soil sample. The large-bore sampling system is a 2-foot long, 1.375-inch diameter, stainless steel, discrete soil sampler which also uses a PETG liner to collect a continuous soil sample.

The borings will be advanced into the groundwater table to a depth of fifteen feet. The depth of fifteen feet was selected to ensure that sufficient data will be collected for comparisons against the RDEC in the RSR. Soil samples will be collected from each of the borings in continuous two-foot intervals to fourteen feet, with a one-foot interval from fourteen to fifteen feet. Each boring will be logged as it is drilled in accordance with the LEA SOP for Geologic Logging of Unconsolidated Sedimentary Materials included in Appendix E. The geologic materials encountered will be recorded on LEA Boring Log Forms. Copies of typical field forms are

included in Appendix F. The Burmister Classification System and the Munsell Color Chart will be used to log the geologic materials.

Aliquots of the soil samples collected from each sampling interval will be field screened for VOCs with a photoionization detector (PID) or equivalent. Each soil sample will also be analyzed in the LEA Analytical Laboratory for the presence of target VOCs including BZ, EBZ, PCE, TCA, TCE, TL, and XYL. All soil samples collected will be transported in iced coolers under chain-of-custody control to the fixed analytical laboratory. At least one sample per boring will be submitted for fixed laboratory analysis. The samples for fixed laboratory analysis will be selected based on the results of the field screening, visual or olfactory evidence, the target VOC analyses, and the potential release mechanism of a surficial release for this area. The samples will be collected in accordance with the LEA SOP for Soil Sampling included in Appendix E.

2.4.3 Groundwater Sampling

A groundwater sample will be collected from each soil boring with a total of eight groundwater samples for the groundwater sampling portion of this investigation. The groundwater samples will be collected from each boring at the groundwater table using the Geoprobe[®] screen-point sampler. With the use of a peristaltic pump and dedicated tubing, the sampler will be purged of a small amount of water in order to fill the tubing. The groundwater sample will then be collected directly into prelabelled sample containers appropriate for the required analysis. All groundwater samples will be transported in iced coolers under chain-of-custody control to a fixed laboratory for laboratory analysis. The groundwater sampling will be performed in accordance with the LEA SOP for Liquid Sample Collection and Field Analysis included in Appendix E.

2.4.4 Analytical Parameters and Methods

Each of the soil samples collected will be field-screened for VOCs with an PID or equivalent. Each soil sample will also be analyzed in the LEA Analytical Laboratory for the presence of target VOCs including BZ, EBZ, PCE, TCA, TCE, TL, and XYL. At least one sample per boring will be submitted for fixed laboratory analysis. The soil sample selected from each boring will be submitted for analysis of VOCs by U.S. Environmental Protection Agency (EPA) Method 8260A, semi-volatile organic compounds (SVOCs) by EPA Method 8270B, TPH by EPA Method 418.1, PCBs by EPA Method 8081, and the RCRA 8 metals plus copper, nickel, and zinc. The metals analyses will be by mass analysis, the toxicity characteristic leaching procedure (TCLP), and the synthetic precipitation leaching procedure (SPLP) analysis.

Each of the eight groundwater samples collected will be submitted for analysis of VOCs by EPA Method 8260A, SVOCs by EPA Method 8270B, TPH by EPA Method 418.1, PCBs by EPA Method 8081, and dissolved metals including the RCRA 8 metals plus copper, nickel, and zinc.

2.4.5 Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) procedures for field activities and sample collection will be performed during the course of the investigation. The procedures will include:

- Trip blanks will be collected each sampling day for analysis of VOCs by EPA Method 8260A.
- Duplicate samples will be collected at a rate of one per twenty media samples during the investigation. Duplicate samples will be blind duplicates. Sampling personnel will make every effort to ensure that duplicate samples and their corresponding samples are as similar in composition as possible.
- Field-equipment blanks will be collected by pouring distilled, deionized water through and over decontaminated sampling equipment into prelabelled sample containers, with the time of collection noted. Field-equipment blanks will be collected at the rate of one per day.
- The chain-of-custody and field sampling reports will be logged after the collection of each sample.

The above QA/QC procedures will be performed in accordance with the LEA SOP for QA/AC Measures for Field Activities included in Appendix E. QA/QC procedures related to laboratory activities will be the responsibility of the laboratory and must be in accordance with established guidelines for QA/QC for laboratories certified by the State of Connecticut.

2.4.6 Equipment Decontamination

All reusable sampling equipment used during the investigation will be decontaminated before and in-between sample collection. Decontamination of the sampling equipment will be performed according to the LEA SOPs included in Appendix E. Decontamination of the sampling equipment will generally be performed according to the following procedures:

- All loose dirt and debris will be removed from the sampling equipment and placed in an open-top, 55-gallon drum.

- Sampling equipment will then be placed in an Alconox and tap water solution and scrubbed to remove all debris.
- The sampling equipment will be rinsed twice by immersion into two tap-water rinse baths.
- A spray rinse of distilled water will be applied to the equipment.
- A spray of methanol in water will be applied to the equipment.
- Rinse and wash waters will be changed as necessary to ensure complete decontamination of sampling equipment.

2.4.7 Residuals Management

All soil not directly collected into sample containers will be segregated in 55-gallon drums for disposal by P&W. All spent decontamination fluids will be placed into a closed-top, 55-gallon drum. All drums will be labeled as appropriate in the field. For the wastes generated during the investigation, LEA will maintain a log of all waste containers and the geographic origin of their contents. P&W personnel will be notified when drum(s) are filled, when the drums need to be moved to a new location, or when drums can be picked up for disposal.

2.4.8 Health and Safety Plan

A site-specific Health and Safety Plan has been prepared under separate cover for the project. All personnel performing on-site activities related to the tasks identified in this Closure Plan will be familiar with the contents of the site Health and Safety Plan before they begin work at the site.

2.4.9 Documentation

Documentation of all field activities and procedures will be in accordance with the SOPs included in Appendix E. Copies of Field Forms expected to be utilized are included in Appendix F. Information documented on field forms includes sample numbers, soil-boring identification, sample depth, time of sample collection, sampling device, type of sample container, and whether a sample was a duplicate. Samples submitted for laboratory analysis will be transmitted with a chain-of-custody form, which will be supplied by the laboratory to which the samples are being sent.

Following completion of all field activities and a review of the conditions observed and analytical results, Part 2 of the Closure Plan will be prepared documenting the sampling and

investigation activities and providing the results of the unit characterization program for the Former Storage Area. The Part 2 Report will address the following:

- Activities performed during the course of the investigation.
- Field observations.
- Results of all laboratory analyses.
- An evaluation of the data obtained during the investigation.
- Conclusions and recommendations on the proposed closure approach.

2.5 Clean Closure Decision Criterion

Before performing a final evaluation of the analytical data to determine whether or not clean closure of the Former Storage Area has been accomplished by satisfying the RSR, it is necessary to demonstrate that the investigation performed was adequate to identify potential release(s) from the unit and to characterize the nature and extent of any contamination associated with those releases. For this clean closure determination, this evaluation will include an evaluation of the locations and depths at which the release would have likely occurred (surficial), sampling locations and depths relative to potential releases, and potential contaminant transport pathways. It is also necessary to evaluate whether or not the appropriate media were sampled and analyses performed on samples of various media were appropriate for detection of potential releases of the constituents of concern for the unit.

After determining whether the closure investigation was adequate and that the sampling and analyses were representative of site conditions, the next step in the evaluation process is to compare the data from the closure sampling to the default numeric criteria presented in the RSR. Default numeric criteria for individual constituents are media-specific and comparison to more than one set of criteria for both soil and groundwater is required. The evaluation will be completed by media and will include a comparison to all relevant criteria for each medium and the site-specific conditions to determine if clean closure has been accomplished. Soil data will be compared to the default numeric RDEC and the GBPMC for each of the constituents detected. Groundwater concentrations will be compared to the default numeric SWPC and the RVC. If concentrations detected in soil and/or groundwater at the site exceed the default numeric criteria, then further evaluation relative to the RSR is warranted.

The applicable numeric criteria that will be evaluated for the closure are those criteria which have been specifically identified in Appendices A through E of the RSR. The determination of

criteria for constituents which do not have **default** numeric criteria specifically identified in the RSR was not performed as part of this project. Although there have not been any constituents detected which do not have default numeric criteria specifically identified in the RSR, the determination of criteria for constituents **without** default numeric values shall be performed once a particular constituent is identified and the necessary closure sampling and analyses are complete.

For soils to satisfy the RDEC, given the **least restrictive** future use, soils within fifteen feet of the ground surface must exhibit contaminant concentrations which are lower than the applicable criteria. To satisfy the PMC, soils above the water table must not be contaminated with substances at concentrations greater than the PMC applicable to the particular groundwater classification of the area. For the Former Storage Area with a GB groundwater classification, the seasonal high water table is the depth criteria.

The PMC were developed to address the **potential** for contaminants in soil in the unsaturated zone to leach to groundwater. For VOCs, the analytical results on a mass analysis must not exceed the applicable criteria. For inorganic compounds and PCBs, the analytical results of a TCLP or SPLP must not exceed the applicable criteria. For the closure, detected concentrations in soil by the SPLP analyses will be compared to the default numeric GBPMC due to the areas groundwater classification of GB.

Groundwater data collected during the closure sampling will be compared to appropriate default numeric criteria presented in the RSR for the surface water protection and the volatilization scenarios. The SWPC apply to contaminant plumes which discharge directly to a surface water body. The SWPC applies to the average concentration of a contaminant within a groundwater plume or to the concentration of a contaminant in the plume immediately upgradient of the receiving surface water body if the plume is in a steady-state condition. The VC apply to plumes containing VOCs where the depth to groundwater is less than fifteen feet below ground surface. Detected concentrations of constituents in groundwater will be compared to the default numeric RVC and SWPC to determine if exceedances are present.

2.6 Closure Schedule

Completion of the closure activities for the Former Storage Area will be within 180 days of written approval of the Closure Plan. In terms of the three part Closure Plan process utilized by the DEP, the 180 period will begin with approval of Part 3 of the Closure Plan. To provide an

indication of the overall schedule closure **schedule**, the anticipated closure schedule including milestone dates for the three part process is shown below.

<u>Activity</u>	<u>Days to Completion</u>	<u>Total Days</u>
Part 1 Closure Plan Submittal		0
Unit Characterization Activities	15 days	15 days
Part 2 Closure Plan Submittal	30 days	45 days
DEP Review and Approval	90 days	135 days
Part 3 Closure Plan Submittal	30 days	165 days
DEP Review and Approval	30 days	195 days
Public Notice	30 days	225 days
Completion of Closure Activities	15 days	240 days
Completion of Closure Certification	15 days	255 days

P&W will submit an amended Closure Plan within thirty days of an unexpected event which requires modification of the approved Closure Plan in accordance with 40 CFR 265.111(c). Although the intent of the three part Closure Plan process is to minimize or eliminate any unexpected events which could prolong the closure period, P&W will request an extension of the 180 day closure time period in accordance with 40 CFR 265.113 if the closure activities by necessity will take longer than 180 days to complete.

2.7 Closure Cost Estimate

The closure costs associated with the closing of the Former Storage Area at the P&W East Hartford facility are presented in Table 5. These costs are based on October 1997 dollars. This closure cost estimate assumes that the Former Storage Area can be clean closed in accordance with the RSR upon completion of the soil and groundwater investigation as proposed in this Part 1 Closure Plan.

2.8 Closure Certification

The services of a professional engineer will be retained to ensure that the closure activities are in conformance with all parts of the Closure Plan. Within sixty days following the successful completion of the closure activities, a closure certification will be submitted to the Commissioner of the DEP by registered mail. The closure certification will be signed by P&W and an independent registered professional engineer. All necessary supporting documentation will be provided with the closure certification including analytical results, copies of manifests for any

waste shipments, a summary of daily field logs, photographs documenting the closure activities, and a list and description of any modifications to the approved Closure Plan.

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TABLES

Page 1 of 1

2. Printed on 10/17/1997

SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION (DETECTS)-SOIL
P&W East Hartford: Former Storage Area

Page 1 of 1

[illegible]

Notes: 1. Only Detects Shown
2. Printed on 10/17/1997

LEA

Page 1 of 1

Notes: 1. Only Detects Shown
2. Printed on 10/17/1997

Table 4
CONSTITUENTS OF CONCERN
Pratt & Whitney
East Hartford Connecticut

Arsenic
Barium
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Silver
Methanol
Polychlorinated Biphenyls
Tetrachloroethylene
1,1,1-Trichloroethane
Trichloroethylene
Toluene
Xylenes

TABLE 5
CLOSURE COST ESTIMATE

Project: FORMER STORAGE AREA CLOSURE
Site: PRATT & WHITNEY 400 MAIN STREET, EAST HARTFORD, CONNECTICUT

Prepared by: Thomas J. Salimeno
Date: 10/15/97

- Assumptions:**
- Geoprobe borings for contaminant detection within the vicinity of the Former Storage Area.
 - All Geoprobe borings are to 15 feet; sampled at 2-foot intervals; all samples screened for target VOCs in the IEA Analytical Laboratory.
 - One sample per boring will be submitted for fixed laboratory analysis for SVOCs, VOCs, PCBs, TPH, and RCRA 8 metals plus Cu, Ni, and Zn.
 - Eight screen-point groundwater samples collected for SVOCs, VOCs, PCBs, TPH, and RCRA 8 metals plus Cu, Ni, and Zn.

LABOR COSTS

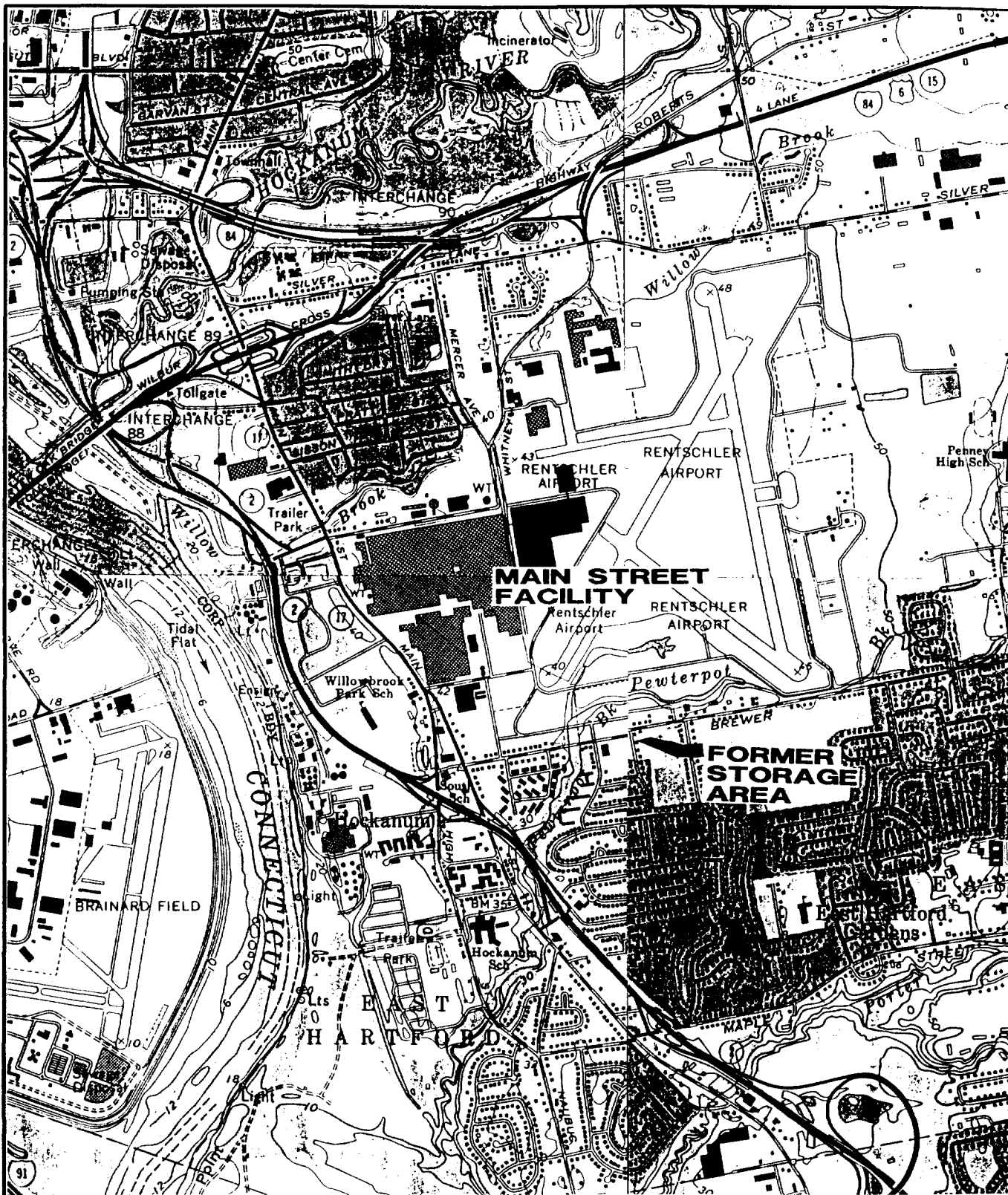
ITEM	ESTIMATED HOURS								Total Hours
	Labor Category Hourly Rate	Principal \$100	Proj. Mgr \$90	Proj. Hydro. \$75	Chemist \$50	Snr. Tech. \$45	Eng. \$55	Design/Draft \$50	
Project Management			4	2			4		10
Establish Field Sampling Locations				4		4			8
Geoprobe Borings (8) to 15 feet				20		20			40
Screen-Point Groundwater Samples (8)				10		10			20
Portable GC Analysis					24				24
Data Management				8					8
Survey New Sample Locations						4	4		8
Revise Site Mapping				2				4	6
Data Review and Evaluation			4	4					8
Prepare Part 2 Closure Plan		2	12				40	24	78
Prepare Part 3 Closure Plan		2	12				24	8	46
Closure Certification		2	4				16		22
Total Hours		6	36	50	24	38	88	36	278
Total Dollars		\$600.00	\$3,240.00	\$3,750.00	\$1,200.00	\$1,710.00	\$4,840.00	\$1,800.00	
Labor Subtotal									\$17,140.00

OTHER DIRECT COSTS

ITEM	Units	Cost/Unit	Total
Geoprobe	3	\$550	\$1,650.00
Field VOC Analyzer	3	\$55	\$165.00
Photovac GC	3	\$215	\$645.00
Miscellaneous Supplies (PPE, Liners, etc.)	3	\$100	\$300.00
Fixed Laboratory Analyses	20	\$630	\$12,600.00
Other Direct Costs Subtotal			\$15,360.00

Estimated Closure Cost: \$32,500.00

FIGURES



MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES
FOR HARTFORD NORTH, HARTFORD SOUTH,
GLASTONBURY, AND MANCHESTER CONN.,
DATED 1964 & 1963 AND REVISED 1992.

1000 0 1000 2000 3000



SCALE IN FEET



RCRA CLOSURE PLAN
FORMER STORAGE AREA
PRATT & WHITNEY MAIN STREET FACILITY
USGS TOPOGRAPHIC MAP

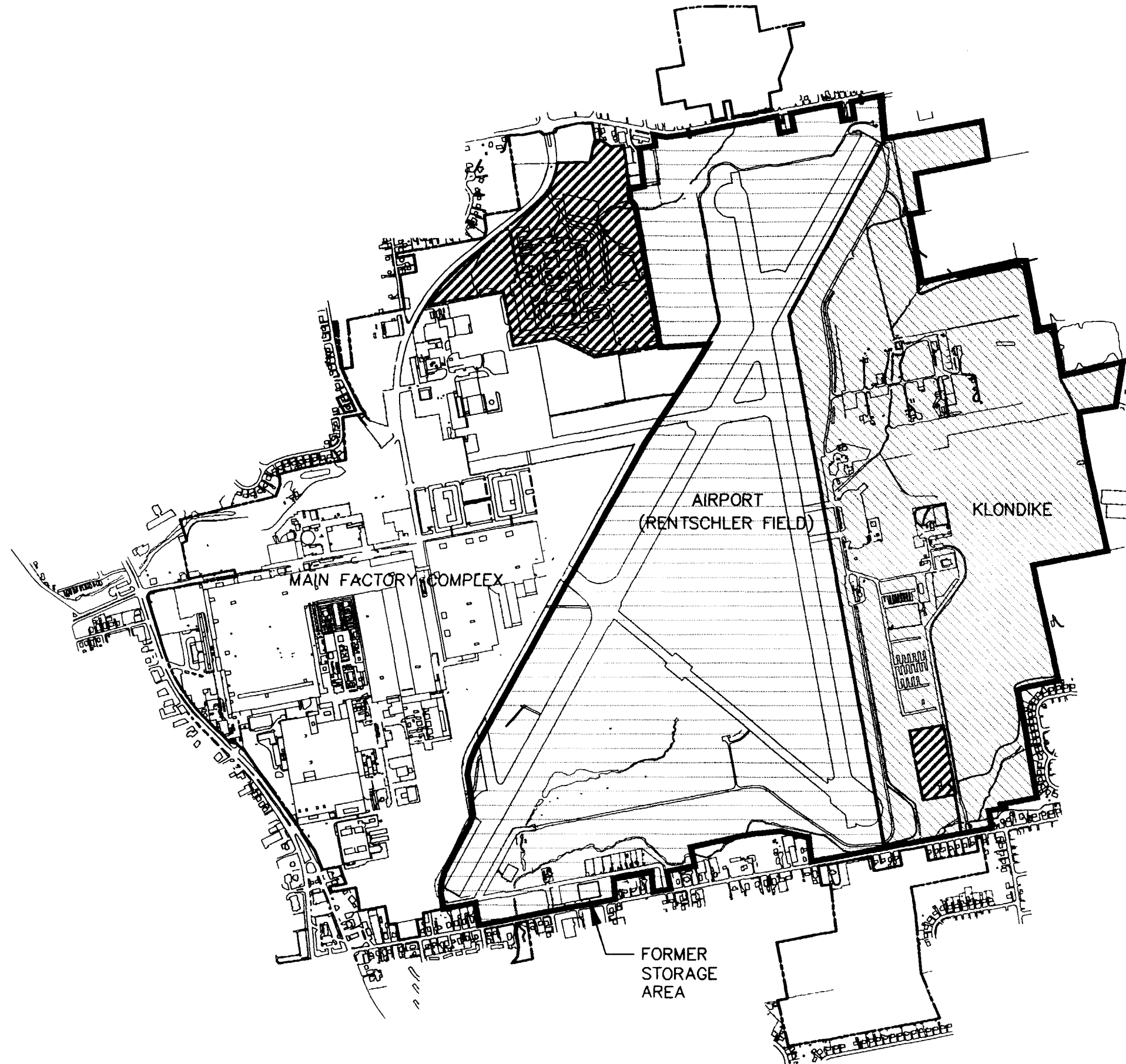
FIG. 1

Comm.No.
68VC630








Pratt & Whitney
A United Technologies Company



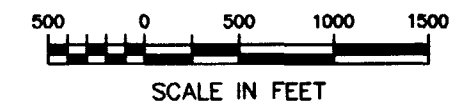


LEGEND

-  Property line (Approximate location)
-  Area boundary (Approximate location)
-  Airport area (Rentschler Field)
-  Klondike area
-  Areas which are not part of the East Hartford Main Street Facility

MAP REFERENCE:

SURVEY CONTROL BY FUSS & O'NEILL, INC
 PHOTOGRAMMETRY BY GOLDEN AERIAL SURVEYS, INC
 DATE OF PHOTOGRAPHY: 3/17/91

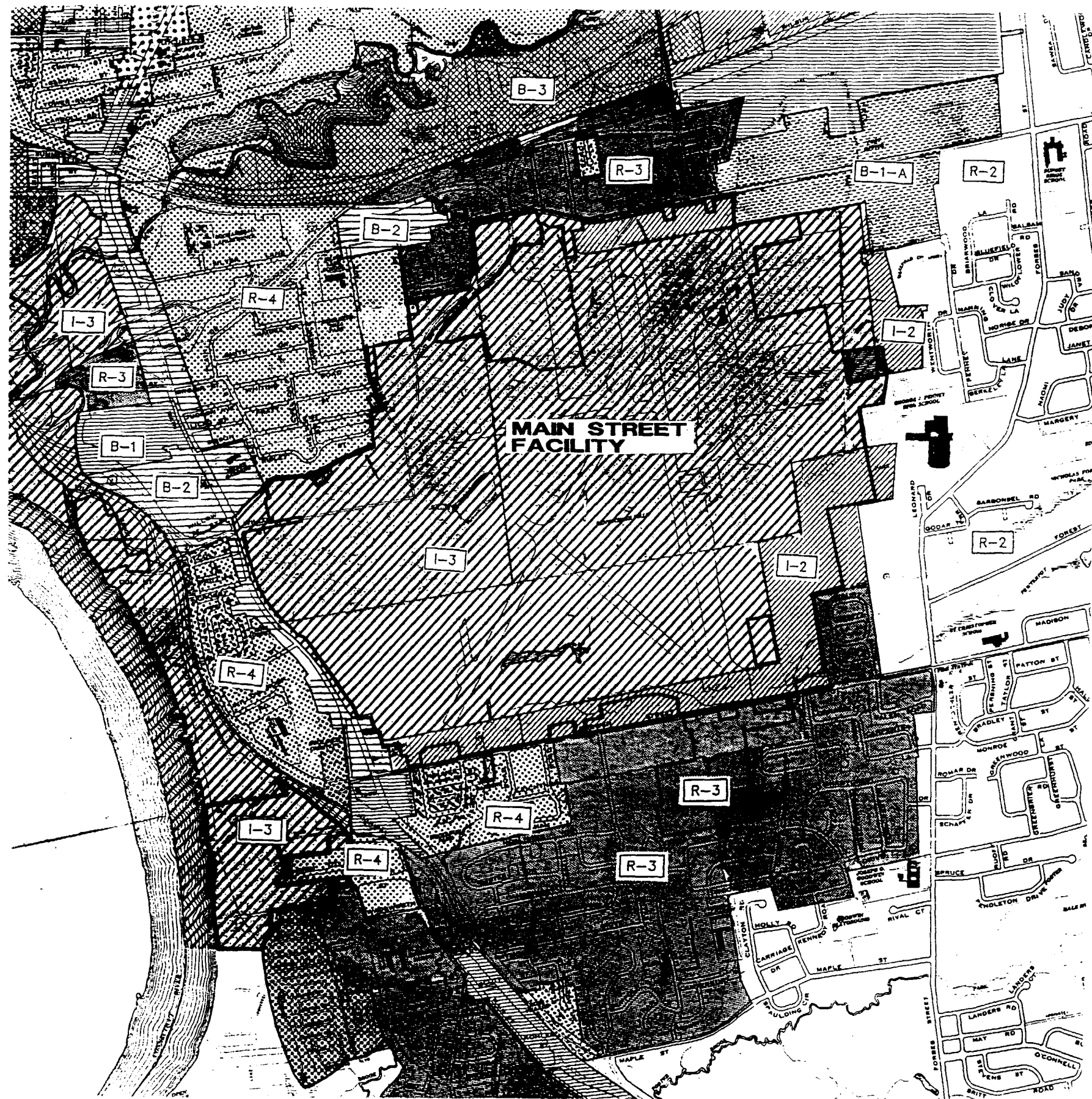


RCRA CLOSURE PLAN
 FORMER STORAGE AREA
PRATT & WHITNEY MAIN STREET FACILITY
 SITE PLAN
 FIG.2

Comm.No.
 68VC630

 **Pratt & Whitney**
 A United Technologies Company

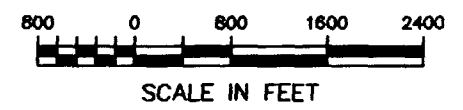
 **LEA**



LEGEND

- Residence 2 (R-2)
- Residence 3 (R-3)
- Residence 4 (R-4)
- Residence 6 (R-6)
- Business 1-A (B-1-A)
- Business 1 (B-1)
- Business 2 (B-2)
- Business 3 (B-3)
- Business 4 (B-4)
- Business 5 (B-5)
- Industry 1 (I-1)
- Industry 2 (I-2)
- Industry 3 (I-3)

MAP REFERENCE:
 ZONING MAP OF THE TOWN OF EAST HARTFORD
 ADOPTED AUGUST 1, 1981.
 LAST REVISION DATE: FEBRUARY 29, 1996

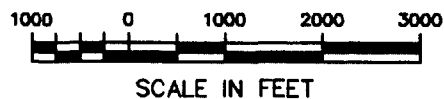
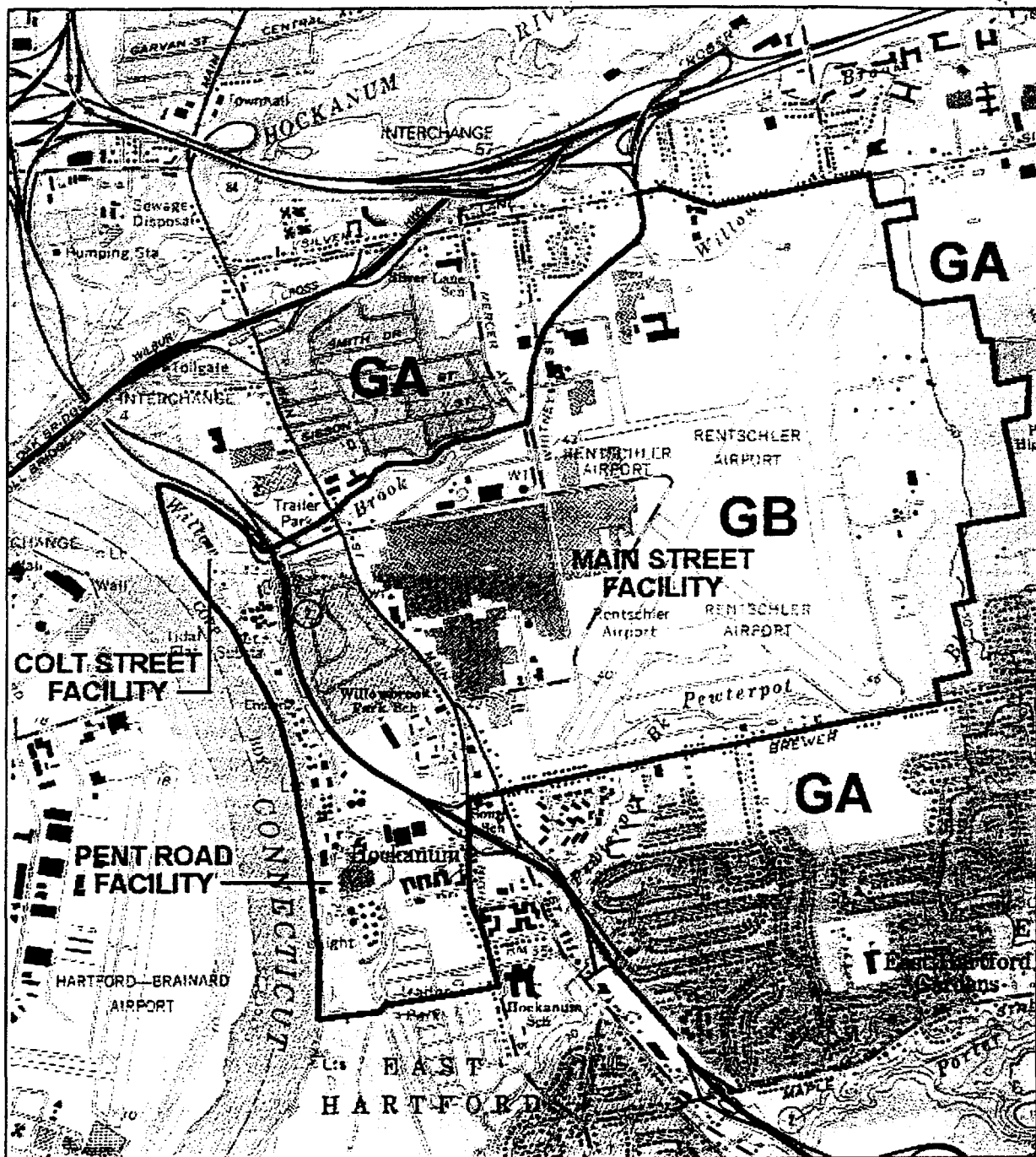


RCRA CLOSURE PLAN
 FORMER STORAGE AREA
PRATT & WHITNEY MAIN STREET FACILITY
 ZONING MAP
 FIG.3

Comm.No.
68VC630

Pratt & Whitney
 A United Technologies Company

LEA



NOTES:
Groundwater classifications from "ADOPTED WATER QUALITY CLASSIFICATIONS FOR THE CONNECTICUT RIVER BASIN: CTDEP, JUNE, 1988. Modified per groundwater reclassification petition, AUGUST, 1996.

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY, AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

**RCRA CLOSURE PLAN
FORMER STORAGE AREA
PRATT & WHITNEY MAIN STREET FACILITY
GROUNDWATER CLASSIFICATIONS
FIG. 4**

Comm.No.
68VC630



Pratt & Whitney
A United Technologies Company

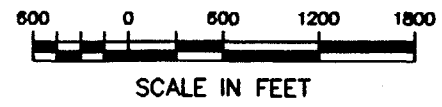




KEY TO MAP

- 500-Year Flood Boundary —————
- 100-Year Flood Boundary —————
- FLOODWAY FRINGE —————
- 100-Year Flood Boundary —————
- 500-Year Flood Boundary —————
- Approximate 100-Year Flood Boundary —————
- Cross Section Line ————— A ————— A
- Elevation Reference Mark ————— RM7x
- River Mile ————— •M1.5

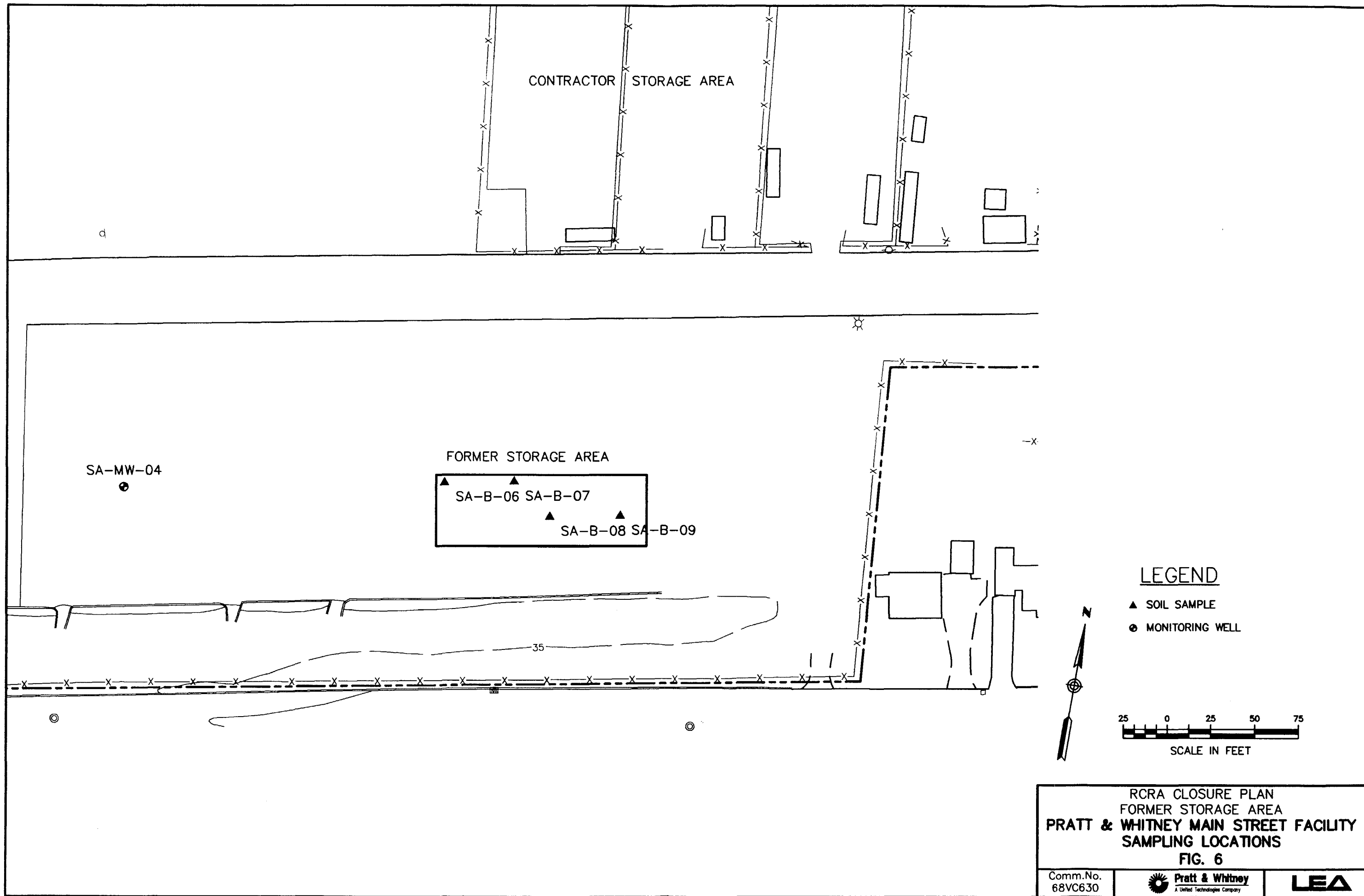
MAP REFERENCE:
 BASED ON INFORMATION OBTAINED FROM THE
 FLOODWAY FLOOD BOUNDARY AND FLOODWAY MAP
 FOR THE TOWN OF EAST HARTFORD, CONNECTICUT,
 HARTFORD COUNTY, COMMUNITY-PANEL NUMBERS
 090026 0001-0004, PANELS 1, 2, 3 & 4 OF 4,
 MAP REVISED: OCTOBER 23, 1981.



RCRA CLOSURE PLAN
 FORMER STORAGE AREA
PRATT & WHITNEY MAIN STREET FACILITY
FLOODPLAIN MAP
 FIG. 5

Comm.No.
68VC630

Pratt & Whitney
A United Technologies Company



APPENDIX A

Background Information on the Former Storage Area



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



May 4, 1989

RECEIVED

MAY - 8 1989

FUSS & O'NEILL, INC.

Mr. Arthur C. Caldwell
Manager, Facilities Engineering
United Technologies / Pratt & Whitney Corp.
400 Main Street
East Hartford, CT 06108

Dear Mr. Caldwell:

RE: Disposal of approximately 1900 cubic yards of solvent-contaminated soils from bulk virgin material storage facilities in East Hartford (piles #1 and #2) and North Haven (piles #1 and #2).

This is in response to your letter of 4/17/89 proposing alternatives to incineration of the solvent-contaminated soils from the tank storage facilities at your East Hartford and North Haven plants.

As provided for in 40 CFR 261.33(d), excavated spill residues of listed virgin chemical products are included in the definition of listed hazardous wastes. Listed contaminants which tested positively in the soils excavated at the East Hartford and North Haven sites included:

- Perchloroethylene (EPA waste identification number U210)
- Toluene (U220)
- 1,1,1-Trichloroethane (U226)
- Trichloroethylene (U228)
- Xylene (U239)

Consultation with the August 17, 1988 Federal Register ("Land Disposal Restrictions for First Third Scheduled Wastes; Final Rule") and 40 CFR 268.10 reveals that all of these wastes except Xylene are "Soft Hammer" Land-Banned wastes. For "Soft Hammer" wastes, there is no EPA-designated treatment standard or BDAT (Best Demonstrated Available Treatment technology). However, they must be treated by an "appropriate treatment technology" (see pages 31175-31176 of the 8/17/88 FR for some possible acceptable technologies) and any ash or other treatment residue must be disposed of in a permitted hazardous waste facility meeting all the minimum technical requirements of a RCRA Subtitle C disposal facility. All the proper certification and demonstration documentation must be generated for the waste, and copies sent to the appropriate disposal facility (see page 31143 and pages 31179-31186 of the 8/17/88 FR for a more detailed discussion on the information requirements for the disposal of "Soft Hammer" listed hazardous wastes).

In reference to the variances you requested in your letter, neither 40 CFR nor the "Soft Hammer" rules allow for treatment of these wastes without a permit. Disposal of treatment residues in a non-permitted landfill is also not permissible, unless the residue (or ash) is delisted. You should also be aware

Phone:

165 Capitol Avenue • Hartford, Connecticut 06106

that the certification and demonstration requirements still apply even if you send the waste for disposal outside of the United States.

A special note on soil pile #2 at North Haven: the test results for this pile did not indicate the presense of any listed wastes. Hence, this material may possibly be non-land-banned or even non-hazardous. However, in order to determine this, we request that this pile be tested for EP Toxicity and 8010/8015/8020 organics. Please note that the organics samples should be discrete, not composite. The EP Toxicity samples may be composited. All samples should be taken at least two feet below the surface of the pile, and should be handled, stored, and analyzed in accordance with the procedures outlined in SW-846. A minimum of four samples must be taken from the pile.

If you have any questions on this matter, please contact me at 566-5712.

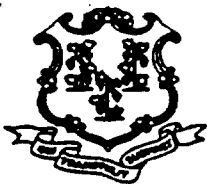
Very Truly Yours,



Ross Q. Bunnell
Engineer
Hazardous Materials Management Unit

RQB:rqb

cc: David McKeegan - Solid Waste Management Unit
David Montany - Full & O'Neill Associates ✓



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



April 13, 1989

See 4/17/89
Mr. Arthur Caldwell
Pratt & Whitney
400 Main St.
East Hartford, CT 06108

*Scott S. Planchette
+ file*

Re: Disposal of approximately 200 cubic yards of contaminated soil (soil pile #3) from storage tank removal in north tank farm at Pratt & Whitney, East Hartford.

Dear Mr. Caldwell:

The Solid Waste Management Unit has determined that the above referenced material is suitable for disposal at the East Hartford solid waste disposal area, subject to the following conditions:

1. material should not contain any free draining liquids.
2. it may be used as cover material at the landfill.

This determination is based on the review of analytical results of soil samples submitted to our office and the Hazardous Materials Management Unit by Pratt & Whitney, East Hartford.

Permission to dispose of this material must also be obtained from the landfill operator.

It is the responsibility of Pratt & Whitney to make a waste determination on all wastes generated prior to disposal and to frequently reevaluate these determinations.

Please contact David McKeegan at 566-5847 if you have any questions.

Very truly yours,

David J. McKeegan
for Charles Kurker
Director
Solid Waste Management Unit

CK/dkm

cc: Mike Vespa, East Hartford Sanitation Dept.
Ross Bunnell, DEP HMMU

165 Capitol Avenue • Hartford, Connecticut 06106

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STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



June 22, 1989

Per 6/30/89 → *Scott S. / Action + File*
Mr. Arthur Caldwell
Manager, Facilities Engineering
United Technologies, Pratt & Whitney
400 Main St.
East Hartford, CT 06108

Re: Disposal of approximately 700 cubic yards of contaminated soil (jet fuel, soil pile #4) from underground storage tank removal at South Production Test Area, Pratt & Whitney's East Hartford Facility.

Dear Mr. Caldwell:

The Solid Waste Management Unit has determined that the above referenced material is suitable for disposal at the East Hartford solid waste disposal area, subject to the following conditions:

1. material should not contain any free draining liquids.
2. it may be used as cover material at the landfill.

This determination is based on the review of analytical results of soil samples conducted by Connecticut Testing Laboratories Inc., Meriden and submitted to our office by Pratt & Whitney, East Hartford.

Permission to dispose of this material must also be obtained from the landfill operator.

Please contact David McKeegan at 566-5847 if you have any questions.

Very truly yours,

Charles Kurker

Charles Kurker
Director
Solid Waste Management Unit

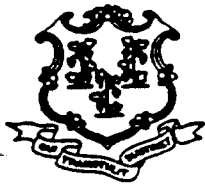
CK/dkm

cc:Mike Vespa, East Hartford Sanitation Dept.

Phone:

165 Capitol Avenue • Hartford, Connecticut 06106

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STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Scott S. ACTION

June 8, 1989

Dec 6/14/89
Mr. Arthur Caldwell
Manager, Facilities Engineering
United Technologies, Pratt & Whitney
400 Main St.
East Hartford, CT 06108

Re: Disposal of approximately 350 cubic yards of contaminated soil (jet fuel, soil pile #5) from underground storage tank removal at Tank Farm #3, Pratt & Whitney East Hartford Facility.

Dear Mr. Caldwell:

The Solid Waste Management Unit has determined that the above referenced material is suitable for disposal at the East Hartford solid waste disposal area, subject to the following conditions:

1. material should not contain any free draining liquids.
2. it may be used as cover material at the landfill.

This determination is based on the review of analytical results of soil samples conducted by Averill Environmental Laboratory, Avon and submitted to our office by Pratt & Whitney, East Hartford.

Permission to dispose of this material must also be obtained from the landfill operator.

Please contact David McKeegan at 566-5847 if you have any questions.

Very truly yours,

Charles Kurker
Charles Kurker
Director
Solid Waste Management Unit

CK/dkm

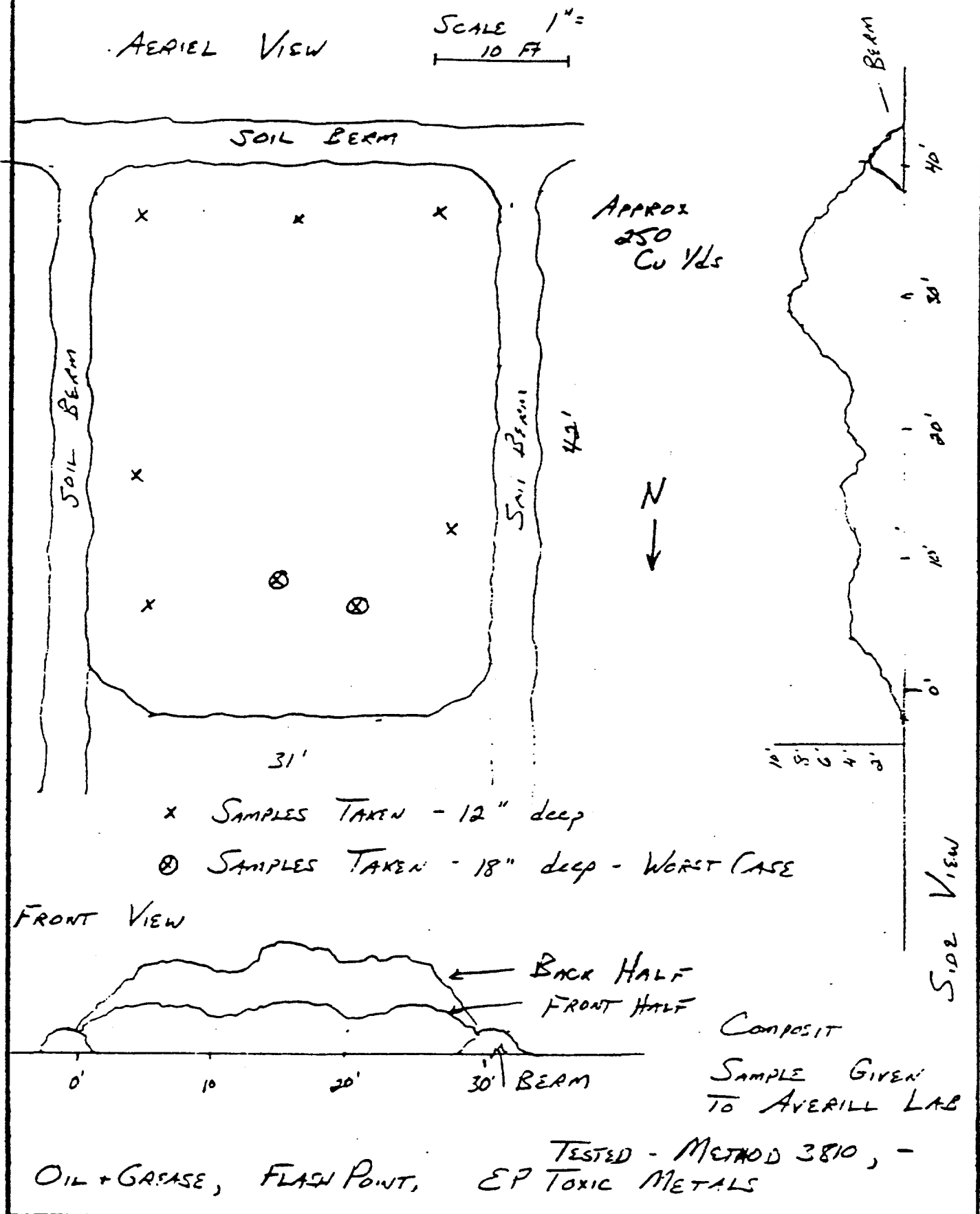
cc:Mike Vespa, East Hartford Sanitation Dept.

Phone:

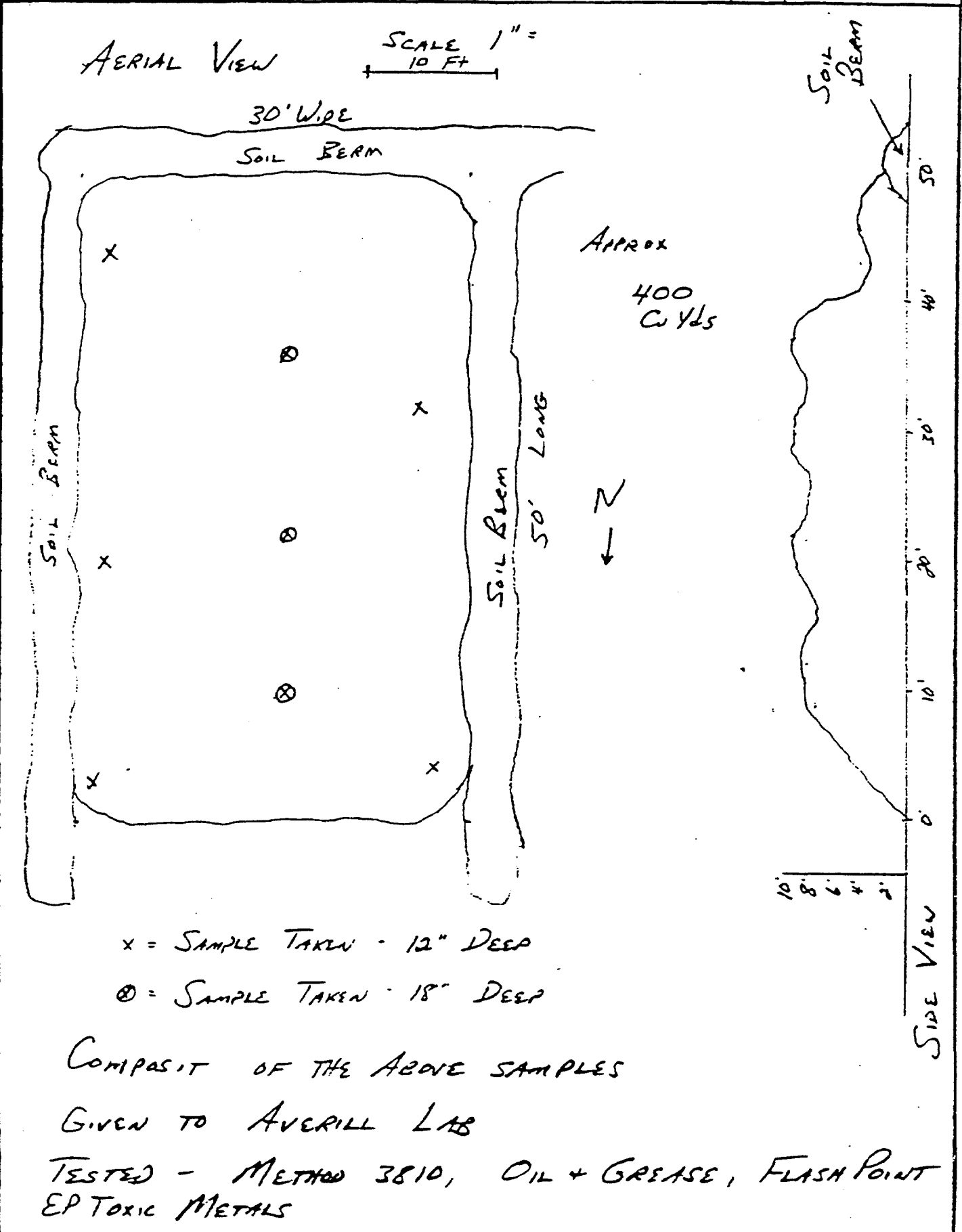
165 Capitol Avenue • Hartford, Connecticut 06106

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MODEL		LE SOIL PILE #1	BY	
FILE		FROM	DATE	
JOB		N. TANK FARM T- 118 → 121	PAGE	OF



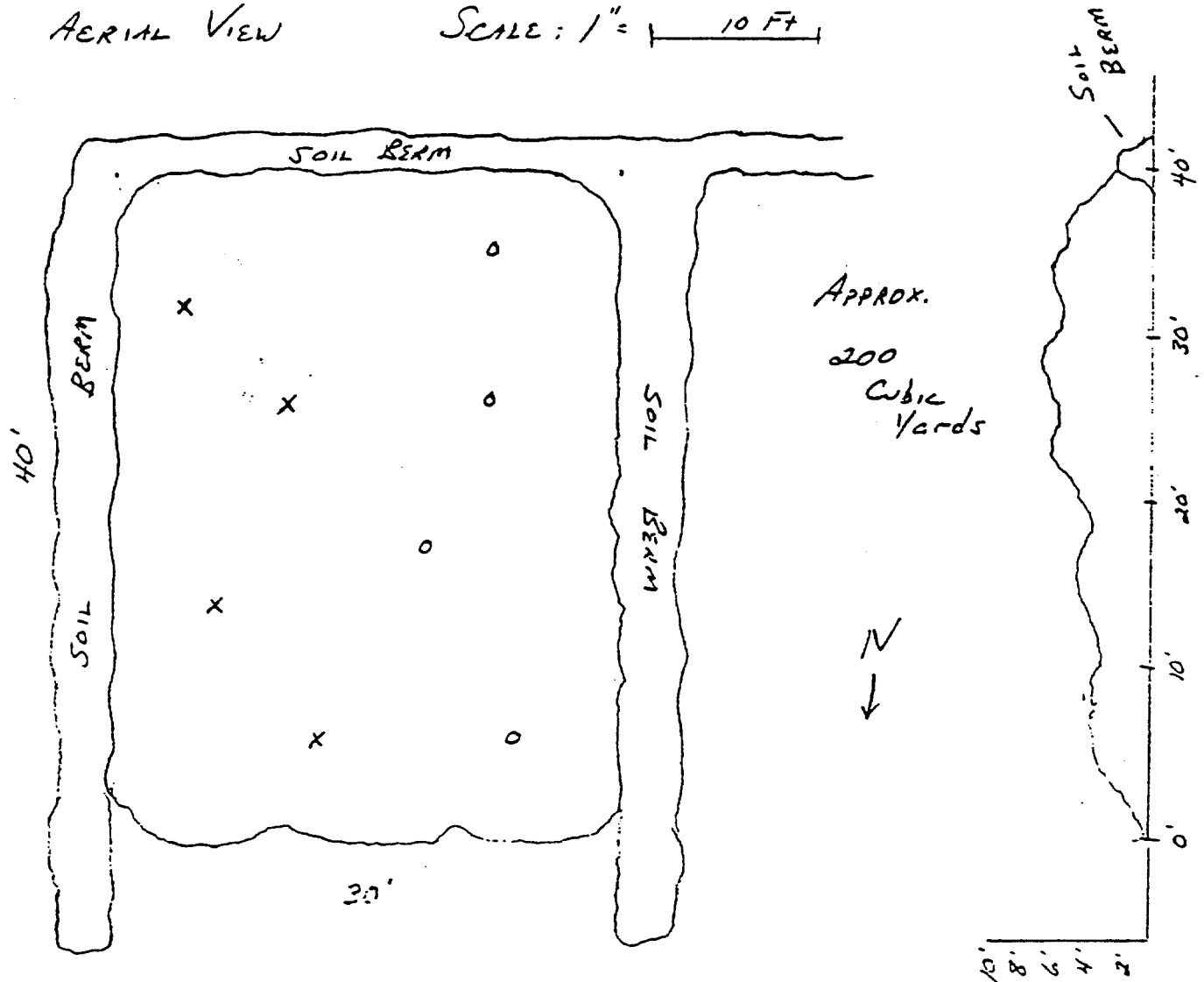
MODEL		...LE SOIL PILE #2	BY	
FILE			DATE	
JOB		FROM N. TANK FARM	PAGE	OF



MODEL		TITLE	SOIL PILE #3	BY	
FILE			FROM NORTH TANK FARM	DATE	
JOB				PAGE	OF

AERIAL VIEW

SCALE: 1" = 10 FT



- ① X SAMPLE TAKEN 18" DEEP
 ② O SAMPLE TAKEN 18" DEEP

X-① SOIL PILE #3 EAST - 4 PT COMPOSIT - TESTED -
 METHOD 3810, OIL + GREASE, FLASH POINT, EP TOX METALS
 O-② SOIL PILE #3 WEST - 4 PT COMPOSIT - TESTED -
 METHOD 3810, OIL + GREASE, FLASH POINT, EP TOX METALS
 THE TWO SAMPLES WERE GIVEN TO AVERILL LAB.

SIDE VIEW

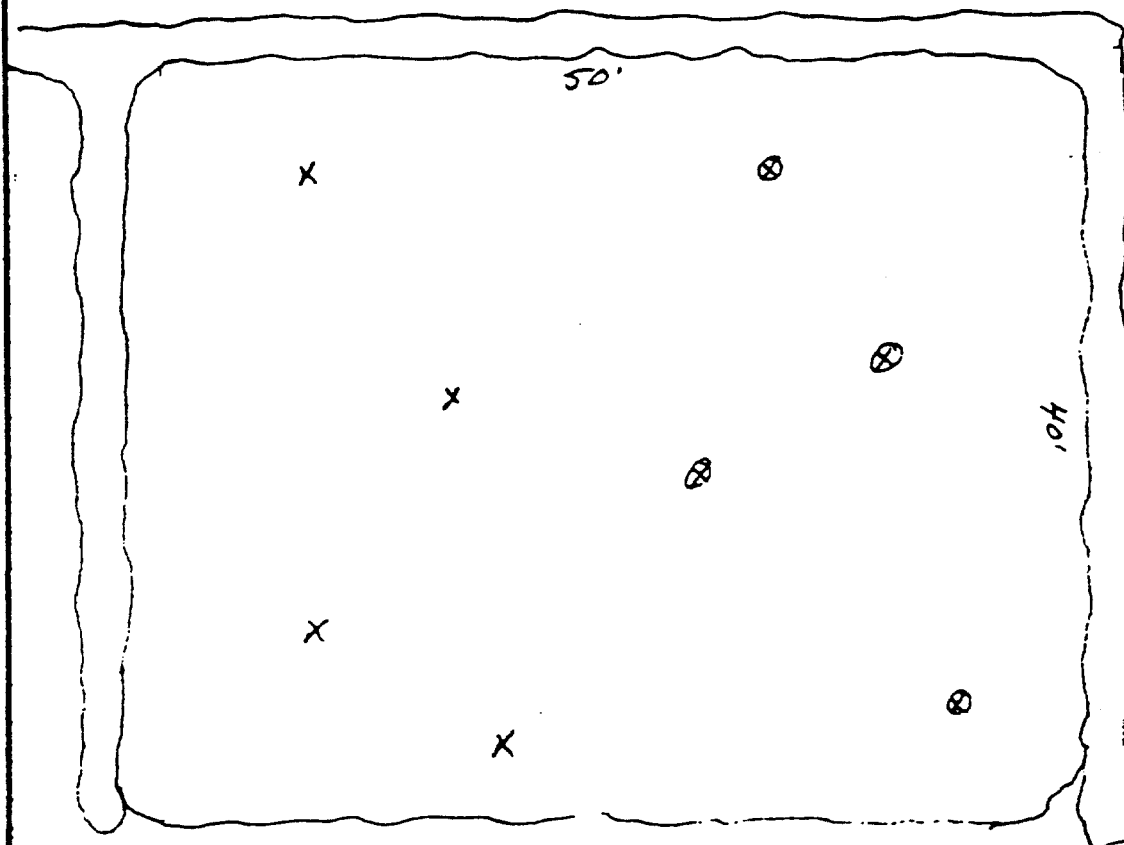
MODEL		TITLE SOIL PILE #4	BY	
FILE		FROM: SOUTH TANK FARM	DATE	
JOB			PAGE	OF

AERIAL VIEW

SCALE

1 INCH =

10 FT



APPROX.

700

Cu. Yds

N
↓

ALL SAMPLING POINTS WERE TAKEN AT A
DEPTH OF 18 - 24 INCHES.

X - SOIL PILE #4 EAST - 4 PT COMPOSIT - TESTED
METHOD 3810, OIL + GREASE, FLASH POINT, P.C.B.,
EP TOX METALS - NICKEL + ZINC

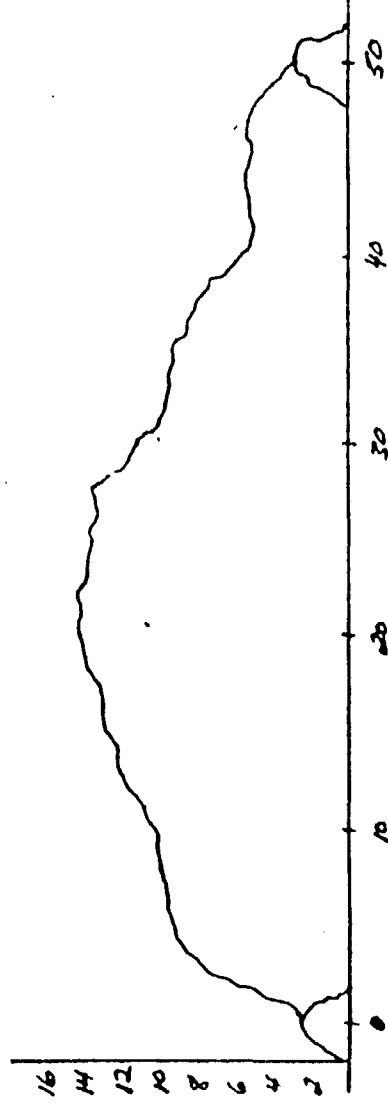
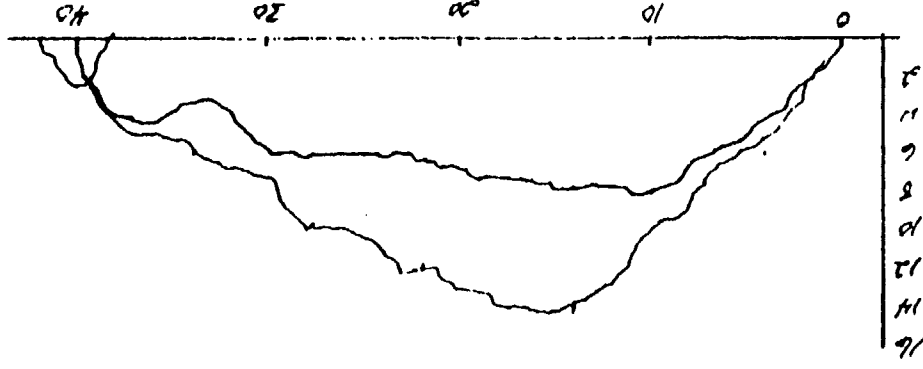
⊗ - SOIL PILE #4 WEST - 4 PT COMPOSIT - TESTED
METHOD 3810, OIL + GREASE, FLASH POINT, PCB,
EP TOX METALS - NICKEL + ZINC

BOTH SAMPLES WERE GIVEN TO AVERILL
LAB FOR ANALYSIS.



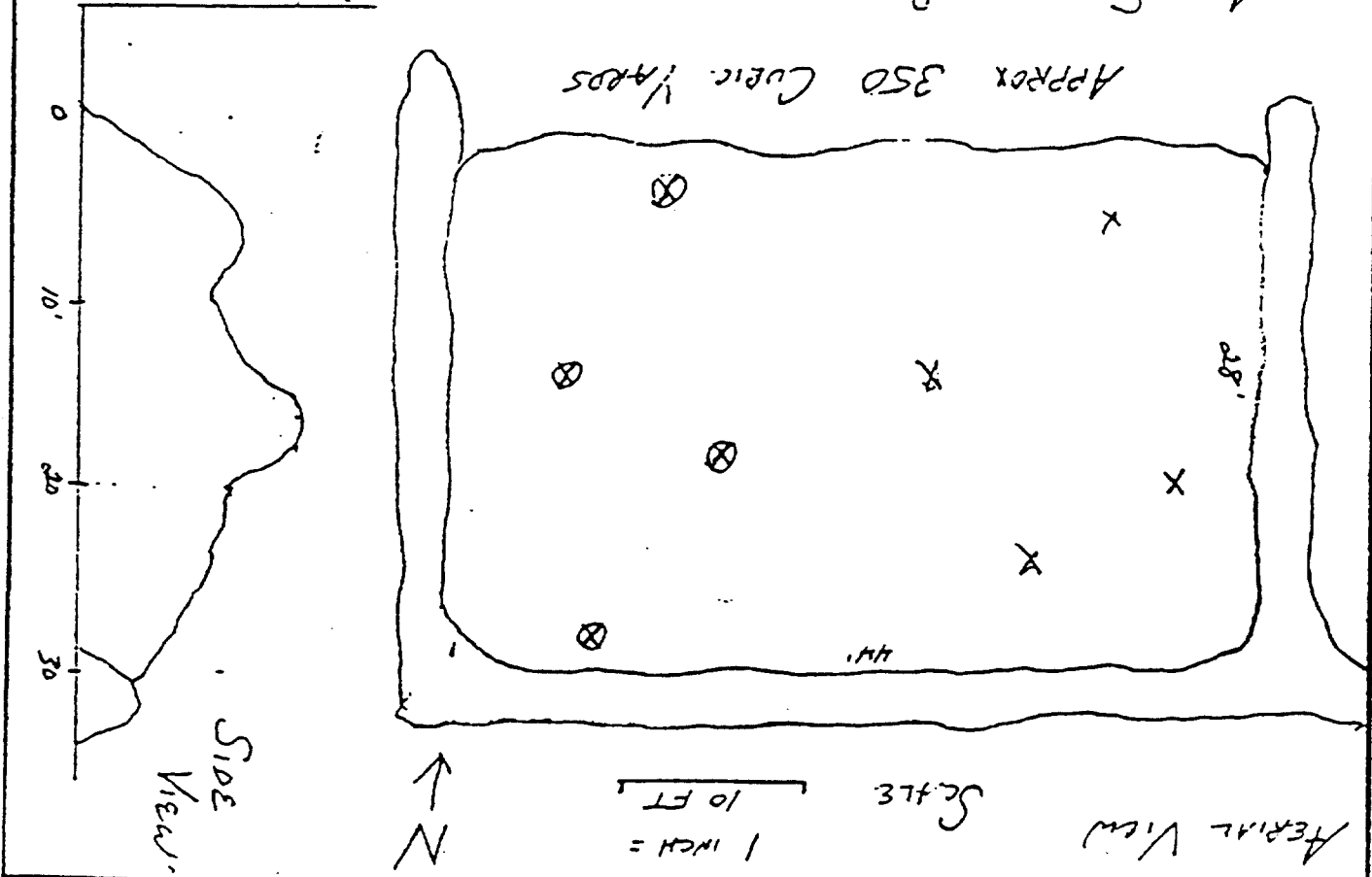
MODEL	TITLE SOIL PILE #4			BY
FILE	FROM:			DATE
JOB	SOUTH TANK FARM			PAGE
				OF

APPROX. 700 CUBIC YARDS



FRONT VIEW
LOOKING SOUTH
W →

TITLE Soil File #5		JOB	
FROM: TANK FARM #3		FILE	
DATE		MODEL	
PAGE		OF	



- X - Soil File #5 East - 4 Pt Composite - Tested
Method 3810, Oil + Grease, Flash Point, PCB,
EP Tox Metals - Nickel & Zinc
- ⊗ - Soil File #5 West - 4 Pt Composite - Tested
Method 3810, Oil + Grease, Flash Point, PCB,
EP Tox Metals - Nickel & Zinc

Both Samples were given to Averil Lab
for Analysis

APPENDIX B

Background Information on the Former Underground Storage Tanks

TABLE I

NORTH, SOUTH, AND EXPERIMENTAL TEST TANK FARM INVENTORY

North Tank Farm:

<u>Tank I.D. No.</u>	<u>Capacity (gallons)</u>	<u>Date of Use</u>	<u>Contents</u>	<u>Comments</u>
100	10,000	1929-1989	Fuel Oil	Abandoned in place
101	10,000	1929-1989	Fuel Oil	Removed 2/89
102	10,000	1929-1989	Fuel Oil	Removed 2/89
103	20,000	1929-1989	Methanol	Abandoned in place 2/89
104	10,000	1929-1989	Fuel Oil	Removed 2/89
105	10,000	1929-1989	Fuel Oil	Removed 1/89
106	10,000	1929-1989	Gasoline, Regular	Abandoned in place 1/89
107	20,000	1940-1989	Gasoline, Regular	Removed 10/86
108	20,000	1940-1986	Gasoline, Regular	Removed 10/86
109	20,000	1940-1988	Oil/Water	Removed 10/88
110	20,000	1940-1988	Oil/Water	Middle third removed-ends filled with concrete
111	20,000	1940-1978	Unknown	Removed 1978
112	10,000	1940-1978	Unknown	Removed 1978
113	10,000	1940-1978	Unknown	Removed 1978
114	2,500	1940-1978	Unknown	Removed 1978
115	2,500	1940-1978	Unknown	Removed 1978
116	20,000	1940-1988	Gasoline, Leaded	Abandoned in place 12/88
117	20,000	1940-?	Gasoline, Leaded	Abandoned in place 12/88
118	10,000	1940-1989	Tetrachloroethylene	Removed 1/89
119	10,000	1940-1989	1,1,1-Trichloroethane	Removed 1/89
120	10,000	1940-1989	1,1,1-Trichloroethane	Removed 1/89
121	10,000	1940-1989	Tetrachloroethylene	Removed 1/89
122	10,000	1940-1989	Hydraulic Oil	Removed 1/89
123	10,000	1940-1989	Hydraulic Oil	Removed 2/89
124	10,000	1940-1989	Varsol	Removed 2/89
125	10,000	1940-1989	Broaching Oil	Removed 2/89

TABLE I
(Continued)

NORTH, SOUTH, AND EXPERIMENTAL TEST TANK FARM INVENTORY

North Tank Farm:

<u>Tank I.D. No.</u>	<u>Capacity (gallons)</u>	<u>Date of Use</u>	<u>Contents</u>	<u>Comments</u>
126	10,000	1940-1989	Mineral Oil	Removed 2/89
127	10,000	1940-1989	Mineral Oil	Removed 2/89
128	10,000	1940-1989	Hydraulic Oil	Removed 2/89
129	15,000	1940-1986	Jet Fuel	Removed 10/86
130	10,000	1940-1986	Jet Fuel	Removed 10/86
131	10,000	1940-1986	Jet Fuel	Removed 10/86
132	10,000	1940-1986	Jet Fuel	Removed 10/86
133	15,000	1940-1986	Jet Fuel	Removed 10/86
134	15,000	1940-1986	Jet Fuel	Removed 10/86
135	15,000	1940-1986	Jet Fuel	Removed 10/86

South Tank Farm:

141	25,000	1945-1989	Jet Fuel	(a)
142	25,000	1945-1989	Jet Fuel	(a)
143	25,000	1945-1989	Jet Fuel	(a)
144	25,000	1945-1989	Jet Fuel	(a)
145	5,000	1945-1989	Waste Fuel	(a)
146	10,000	1945-1989	Mineral Spirits	(a)
147	10,000	1945-1989	Mineral Spirits	(a)
148	10,000	1978-1989	Waste Fuel	(a)
149	10,000	1978-1989	Waste Fuel	(a)
150	17,000	1950-1989	Waste Fuel	(a)
151	17,000	1950-1989	Jet Fuel	(a)
152	10,000	1951-1989	Mineral Oil	(a)
153	500	1950-1989	Waste Fuel	(a)

TABLE I
(Continued)

NORTH, SOUTH, AND EXPERIMENTAL TEST TANK FARM INVENTORY

Experimental Test Tank Farm:

<u>Tank I.D. No.</u>	<u>Capacity (gallons)</u>	<u>Date of Use</u>	<u>Contents</u>	<u>Comments</u>
158	25,000	1956-1989	Jet Fuel	Abandoned in place 4/18/89
159	25,000	1956-1989	Jet Fuel	Removed 4/12/89
160	40,000	1957-1989	Jet Fuel	Removed 4/18/89
161	40,000	1957-1989	Jet Fuel	Removed 4/13/89

NOTE:

- a. In March and April 1989, eleven tanks were removed and two were abandoned in place from the South Tank Farm.

References:

Supplement to the October 10, 1985 Response to Corrective Action, 10 August 1989, Loureiro Engineering Associates, Inc.; Environmental Screening Investigations, Former North Tank Farm, April 1991, Fuss & O'Neill, Inc.; Current Assessment Summary Report, November 1990, Westinghouse Environmental and Geotechnical Services, Inc.

**US EPA New England
RCRA Document Management System (RDMS)
Image Target Sheet**

RDMS Document ID# 1169

Facility Name: PRATT & WHITNEY (MAIN STREET)

Phase Classification: R-1B

**Document Title: RCRA CLOSURE PLAN PART 1 -
FORMER STORAGE AREA AT THE SOUTH AIRPORT
AREA (11/19/97 TRANSMITTAL LETTER IS ATTACHED)**

Date of Document: 10/01/1997

Document Type: REPORT

Purpose of Target Sheet:

☒ **Oversized** ☐ **Privileged**

☐ **Page(s) Missing** ☐ **Other (Please Provide Purpose
Below)**

Comments:

**PLATE 1: LOCATION MAP - FORMER TANKS, EXISTING
WELLS, 1988 SOIL GAS SURVEY SCREENING
INVESTIGATIONS - NORTH TANK FARM**

*** Please Contact the EPA New England RCRA Records Center to View This Document ***

APPENDIX C

Amended Part A Application



400 Main Street
East Hartford, Connecticut 06108

October 15, 1993

State of Connecticut
Department of Environmental Protection
Waste Management Bureau
165 Capitol Avenue
Hartford, CT 06106

USEPA - Region I
TC Permit Applications - HRR-CAN3
JFK Federal Building
Boston, MA 02203-2211

ATT: David Nash, Director
Waste Engineering & Enforcement Division

RE: RCRA Part A Permit Application
400 Main Street, East Hartford, CT
CTD990672081

Dear Mr. Nash:

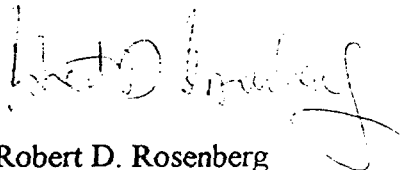
We are hereby transmitting a revised RCRA Part A Permit Application for the referenced facility. The Application has been revised to reflect the following:

1. A temporary onetime soil pile was created during the removal and replacement of the underground storage tanks in the Concentrated Waste Treatment Plant Area. The soil stockpile was located East of CWTP-2. The soil which was stockpiled was characterized as non-hazardous and disposed of at the East Hartford solid waste landfill under a special waste disposal authorization from the Department of Environmental Protection (CTDEP). Closure of this stockpile is included in the Closure Plan for the CWTP Area currently being processed by the CTDEP.
2. A temporary onetime soil pile was created during removal and replacement of underground storage tanks at the site. Impacted soil resulting from potential releases from some of the tank systems was characterized and disposed of as hazardous waste. The soil stockpile was located on the South side of Rentschler Airport, North of Brewer Street. A stand alone Closure Plan has been prepared and submitted to the CTDEP for this soil stockpile.
3. Inclusion of the former Oil Yard container storage area which was located along the North wall of "E" Building. This area was identified in the original Part A Permit Application for the East Hartford Facility. The area routinely handled a variety of oils and solvents (typically product) possibly including waste solvent and/or waste oil/solvent mixtures. Closure of this area has been addressed in the Closure Plan for the CWTP Area currently being processed by the CTDEP.
4. Current status with regards to other environmental permits as required in Section X of the application.

None of the units referenced above are currently being used to manage hazardous waste nor are we planning to use these units to manage hazardous waste in the future. As noted above, all three areas are slated to undergo closure once the corresponding Closure Plans have been approved.

Should you have any questions or comments regarding this matter, please do not hesitate to contact Dave Lis at 557-0905.

Sincerely,




Robert D. Rosenberg
Director, Facilities & Services

Enclosure

cc: John Podgurski, Chief, CT Waste Regulation Section
Lynn Clune, Waste Engineering & Enforcement Division

d-d2g

For EPA Regional Use Only	 United States Environmental Protection Agency Washington, DC 20460 <h1 style="margin: 0;">Hazardous Waste Permit Application</h1> <h2 style="margin: 0;">Part A</h2> <p style="font-size: small;">(Read the Instructions before starting)</p>	For State Use Only
Date Received Month Day Year <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> <div style="width: 10%; border: 1px solid black; height: 20px;"></div> </div>		
I. ID Number(s)		
A. EPA ID Number		B. Secondary ID Number (If applicable)
C T D 9 9 0 6 7 2 0 8 1		
II. Name of Facility		
P R A T T & W H I T N E Y		
III. Facility Location (Physical address not P.O. Box or Route Number)		
A. Street		
4 0 0 M A I N S T R E E T		
Street (continued)		
<div style="display: flex; justify-content: space-between;"> <div>City or Town</div> <div>State</div> <div>ZIP Code</div> </div>		
A S T H A R T F O R D C T 0 6 1 0 8 -		
County Code (if known)	County Name	
	H A R T F O R D	
B. Land Type	C. Geographic Location	D. Facility Existence Date
(enter code)	LATITUDE (degrees, minutes, & seconds)	LONGITUDE (degrees, minutes, & seconds)
P	4 1 4 5 0 0	7 2 3 8 0 1
Month Day Year		
1 9 3 0		
IV. Facility Mailing Address		
Street or P.O. Box		
S A M E		
<div style="display: flex; justify-content: space-between;"> <div>City or Town</div> <div>State</div> <div>ZIP Code</div> </div>		
V. Facility Contact (Person to be contacted regarding waste activities at facility)		
Name (last)		(first)
R O S E N B E R G		R O B E R T
Job Title		Phone Number (area code and number)
D I R E C T O R F & S		2 0 3 - 5 6 5 - 2 6 8 9
VI. Facility Contact Address (See instructions)		
Contact Address cation Mailing	B. Street or P.O. Box	
X		
<div style="display: flex; justify-content: space-between;"> <div>City or Town</div> <div>State</div> <div>ZIP Code</div> </div>		

EPA ID Number (enter from page 1)												Secondary Number (enter from page 1)													
C	T	D	9	9	0	6	7	2	0	8	1														
VII. Operator Information (see instructions)																									
Name of Operator																									
J	N	I	T	E	D		T	E	C	H	N	O	L	O	G	I	E	S		C	O	R	P		
Street or P.O. Box																									
O	N	E		F	I	N	A	N	C	I	A	L		P	L	A	Z	A							
City or Town												State		ZIP Code											
H	A	R	T	F	O	R	D									C	T	0	6	1	0	1	-		
Phone Number (area code and number)												B. Operator Type		C. Change of Operator Indicator		Date Changed									
2	0	3	-	7	2	8	-	7	0	0	0	P	Yes	No	X										
VIII. Facility Owner (see instructions)																									
A. Name of Facility's Legal Owner																									
S	A	M	E		A	S		O	P	E	R	A	T	O	R										
Street or P.O. Box																									
City or Town												State		ZIP Code											
Phone Number (area code and number)												B. Owner Type		C. Change of Owner Indicator		Date Changed									
			-				-						Yes	No											
IX. SIC Codes (4-digit, in order of significance)																									
Primary												Secondary													
3	7	2	4	(description)	Jet Engine Manufacturer													(description)							
Secondary												Secondary													
				(description)														(description)							
X. Other Environmental Permits (see instructions)																									
A. Permit Type (enter code)			B. Permit Number												C. Description										
	R		C	T	D	9	9	0	6	7	2	0	8	1	RCRA Part B Permit Application										
	N		C	T	0	0	0	1	3	7	6				NPDES										
	N		C	T	0	0	0	1	3	7	6				NPDES Renewal										
	E		S	P	0	0	0	0	1	9	1				Sanitary Permit										
	E		9	2	-	1	7	6							Sanitary Permit Renewal										
	E														Stormwater Discharge Application										
	E		5	3	-	0	0	2	0						CT Emissions Permit										
	E		5	3	-	0	0	4	7						CT Emissions Permit										
	E		5	3	-	0	0	5	1						CT Emissions Permit										

EPA I.D. Number (enter from page 1)										Second / ID Number (enter from page 1)													
C	T	D	9	9	0	6	7	2	0	8	1												

XI. Nature of Business (provide a brief description)

Manufacture Jet Engines and Parts

XII. Process - Codes and Design Capacities

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Twelve lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided in Item XII.

B. PROCESS DESIGN CAPACITY - For each code entered in column A, enter the capacity of the process.

1. AMOUNT - Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process unit.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

C. PROCESS TOTAL NUMBER OF UNITS - Enter the total number of units used with the corresponding process code.

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY	UNIT OF MEASURE	UNIT OF MEASURE CODE
D79	DISPOSAL: INJECTION WELL	GALLONS; LITERS; GALLONS PER DAY; OR LITERS PER DAY	GALLONS	G
D80	LANDFILL	ACRE-Feet OR HECTARE-METER	GALLONS PER HOUR	E
D81	LAND APPLICATION	ACRES OR HECTARES	GALLONS PER DAY	U
D82	OCEAN DISPOSAL	GALLONS PER DAY OR LITERS PER DAY	LITERS	L
D83	SURFACE IMPOUNDMENT	GALLONS OR LITERS	LITERS PER HOUR	H
S01	STORAGE: CONTAINER (barrel, drum, etc.)	GALLONS OR LITERS	LITERS PER DAY	V
S02	TANK	GALLONS OR LITERS	SHORT TONS PER HOUR	D
S03	WASTE PILE	CUBIC YARDS OR CUBIC METERS	METRIC TONS PER HOUR	W
S04	SURFACE IMPOUNDMENT	GALLONS OR LITERS	SHORT TONS PER DAY	N
T01	TREATMENT: TANK	GALLONS PER DAY OR LITERS PER DAY	METRIC TONS PER DAY	S
T02	SURFACE IMPOUNDMENT	GALLONS PER DAY OR LITERS PER DAY	POUNDS PER HOUR	J
T03	INCINERATOR	SHORT TONS PER HOUR; METRIC TONS PER HOUR; GALLONS PER HOUR; LITERS PER HOUR; OR BTU'S PER HOUR	KILOGRAMS PER HOUR	R
T04	OTHER TREATMENT (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundment or incinerators. Describe the processes in the space provided in Item XII.)	GALLONS PER DAY; LITERS PER DAY; POUNDS PER HOUR; SHORT TONS PER HOUR; KILOGRAMS PER HOUR; METRIC TONS PER DAY; METRIC TONS PER HOUR; OR SHORT TONS PER DAY	CUBIC YARDS	Y
			CUBIC METERS	C
			ACRES	B
			ACRE-Feet	A
			HECTARES	Q
			HECTARE-METER	F
			BTU's PER HOUR	K

EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
C	T	D	9	9	0	6	7	2	0	8	1												

I. Process - Codes and Design Capacities (continued)

EXAMPLE FOR COMPLETING ITEM XII (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line Number	A. PROCESS CODE (from list above)				B. PROCESS DESIGN CAPACITY		C. PROCESS TOTAL NUMBER OF UNITS	FOR OFFICIAL USE ONLY			
					1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)					
X 1	S	0	2		600	G	0	0	2		
X 2	T	0	3		20	E	0	0	1		
1											
2	S	0	1		59,400	G					
3	S	0	2		96,000	G					
4	S	0	3		800*	Y					
5											
6											
7											
8											
9											
10											
11											
12											

NOTE: If you need to list more than 12 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for additional treatment processes in Item XIII.

XIII. Additional Treatment Processes (follow instructions from Item XII)

Line Number (enter numbers in sequence with Item XII)	A. PROCESS CODE				B. TREATMENT PROCESS DESIGN CAPACITY		C. PROCESS TOTAL NUMBER OF UNITS	D. DESCRIPTION OF PROCESS
					1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)		
	T	0	4					
	T	0	4					
	T	0	4					
	T	0	4					

* One-time short-term storage of excavated

EPA I.D. Number (enter from 1)	Second:	3 Number (enter from page 1)
C T D 9 9 0 6 7 2 0 8 1		

XIV. Description of Hazardous Wastes

- A. EPA HAZARDOUS WASTE NUMBER** - Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR, Part 261 Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.
- B. ESTIMATED ANNUAL QUANTITY** - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.
- C. UNIT OF MEASURE** - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that processes that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. Enter the first two as described above.
2. Enter "000" in the extreme right box of Item XIV-D(1).
3. Enter in the space provided on page 7, Item XIV-E, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form (D.(2)).

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM XIV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number	A. EPA HAZARD WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESS	
				(1) PROCESS CODES (enter)	(2) PROCESS DESCRIPTION (if a code is not entered in D(1))
X 1	K 0 5 4	900	P	T 0 3 D 8 0	
X 2	D 0 0 2	400	P	T 0 3 D 8 0	
X 3	D 0 0 1	100	P	T 0 3 D 8 0	
X 4	D 0 0 2				Included With Above

EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
C	T	D	9	9	0	6	7	2	0	8	1												

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES									
	(1) PROCESS CODES (enter)										(2) PROCESS DESCRIPTION (if a code is not entered in D(1))					
1	F	0	0	7	370	T	S	0	1	S	0	2				
2	F	0	0	8											Included with Line 1	
3	F	0	0	9											"	
4	P	0	1	0											"	
5	P	0	1	5											"	
6	P	0	2	9											"	
7	P	0	3	0											"	
8	P	0	9	8											"	
9	P	1	0	4											"	
10	P	1	0	5											"	
11	P	1	0	6											"	
12	D	0	0	1	6600	T	S	0	1	S	0	2				
13	D	0	0	2											Included with Line 12	
14	D	0	0	3											"	
15	D	0	0	4											"	
16	D	0	0	5											"	
17	D	0	0	6											"	
18	D	0	0	7											"	
19	D	0	0	8											"	
20	D	0	0	9											"	
21	D	0	1	0											"	
22	D	0	1	1											"	
23	U	1	3	3											"	
24	U	1	3	4											"	
25	U	1	8	8											"	
26	U	2	0	1											"	
27	F	0	0	1	370	T	S	0	1	S	0	2				
28	F	0	0	2											Included with Line 27	
29	F	0	0	3											"	
30	F	0	0	4											"	
31	F	0	0	5											"	
32	U	0	0	2											"	
33	U	0	1	9											"	

EPA I.D. Number (enter from page 1)										Secondary ID Number (enter from page 1)													
C	T	D	9	9	0	6	7	2	0	8	1												

XIV. Description of Hazardous Wastes (continued)

Line Number		A. EPA HAZARDOUS WASTE NO. (enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES									
								(1) PROCESS CODES (enter)					(2) PROCESS DESCRIPTION (if a code is not entered in D(1))				
	1	U	0	2	1												Included with Line 27 on previous page
	2	U	0	3	1												"
	3	U	0	3	2												"
	4	U	0	4	4												"
	5	U	0	5	2												"
	6	U	0	5	5												"
	7	U	0	5	6												"
	8	U	0	7	7												"
	9	U	0	8	0												"
	10	U	1	0	8												"
	11	U	1	1	2												"
	12	U	1	1	7												"
	13	U	1	2	1												"
	14	U	1	2	2												"
	15	U	1	3	8												"
	16	U	1	4	0												"
	17	U	1	4	4												"
	18	U	1	5	1												"
	19	U	1	5	4												"
2	0	U	1	5	9												"
2	1	U	1	6	1												"
2	2	U	1	6	5												"
2	3	U	2	1	0												"
2	4	U	2	1	1												"
2	5	U	2	2	0												"
2	6	U	2	2	3												"
2	7	U	2	2	6												"
2	8	U	2	2	8												"
2	9	U	2	3	9												"
3	0	F	0	0	6	6000	P	S	0	1	S	0	2				
3	1																
3	2																
3	3																

EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
C	T	D	9	9	0	6	7	2	0	8	1												

IV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)					B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES														
								(1) PROCESS CODES (enter)					(2) PROCESS DESCRIPTION (If a code is not entered in D(1))									
1	D	0	1	8		40,000	P	S	0	1	S	0	2									
2	D	0	2	2																	Included with Line 1 above	
3	D	0	2	8																	"	
4	D	0	2	9																	"	
5	D	0	3	5																	"	
6	D	0	3	7																	"	
7	D	0	3	9																	"	
8	D	0	4	0																	"	
9	D	0	4	3																	"	
10	D	0	0	4		1	T	S	0	1	S	0	2									
11	D	0	0	5																	Included with Line 10 above	
12	D	0	0	6																	"	
13	D	0	0	7																	"	
14	D	0	0	8																	"	
15	D	0	0	9																	"	
16	D	0	1	0																	"	
17	D	0	1	1																	"	
18	D	0	1	2																	"	
19	D	0	1	3																	"	
20	D	0	1	4																	"	
21	D	0	1	5																	"	
22	D	0	1	6																	"	
23	D	0	1	7																	"	
24	D	0	1	9																	"	
25	D	0	2	0																	"	
26	D	0	2	1																	"	
27	D	0	2	3																	"	
28	D	0	2	4																	"	
29	D	0	2	5																	"	
30	D	0	2	6																	"	
31	D	0	2	7																	"	
32	D	0	3	0																	"	
33	D	0	3	1																	"	

EPA I.D. Number (enter from page 1)

Secondary ID Number (enter from page 1)

C T D 9 9 0 6 7 2 0 8 1

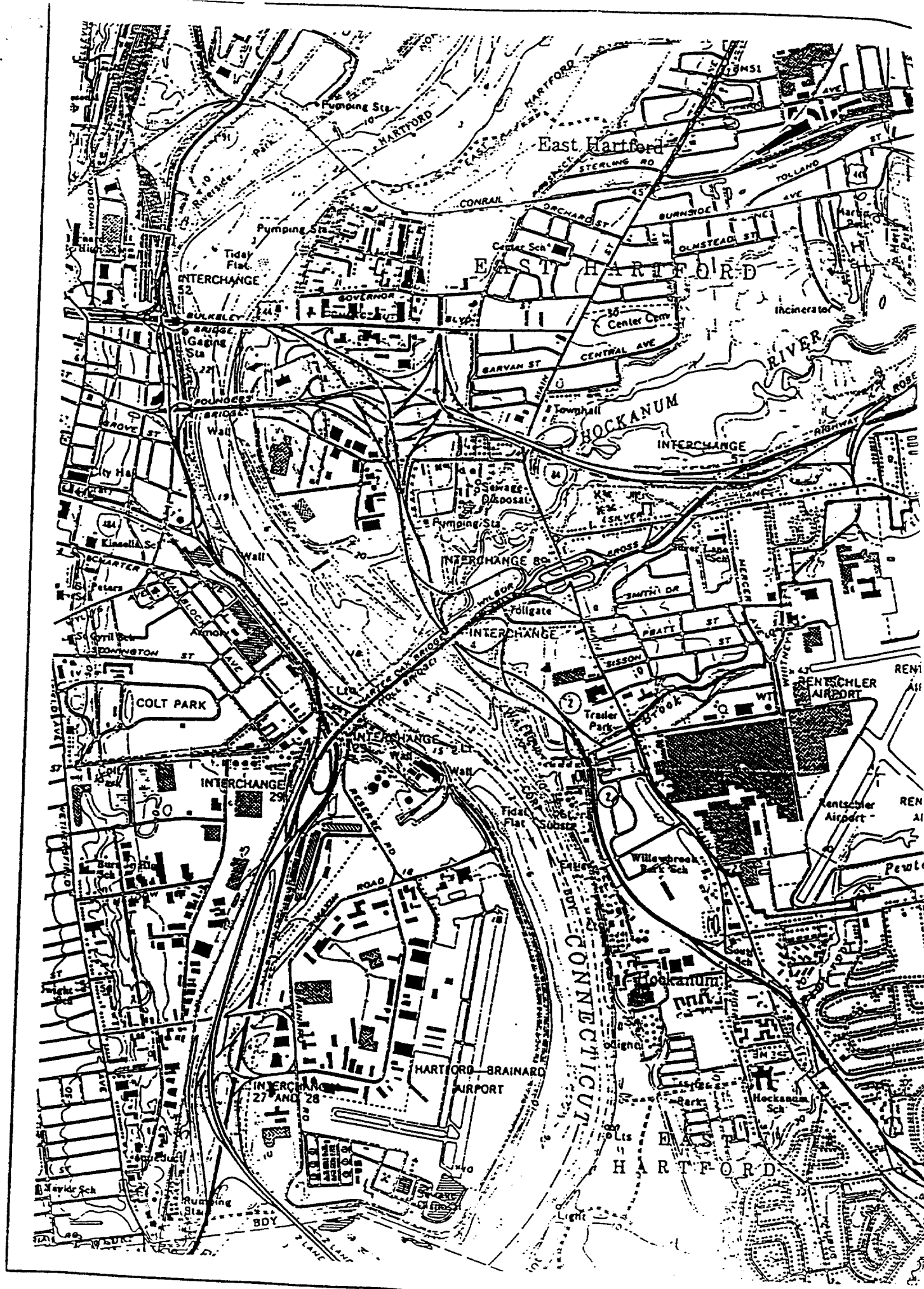
XIV. Description of Hazardous Wastes (continued)

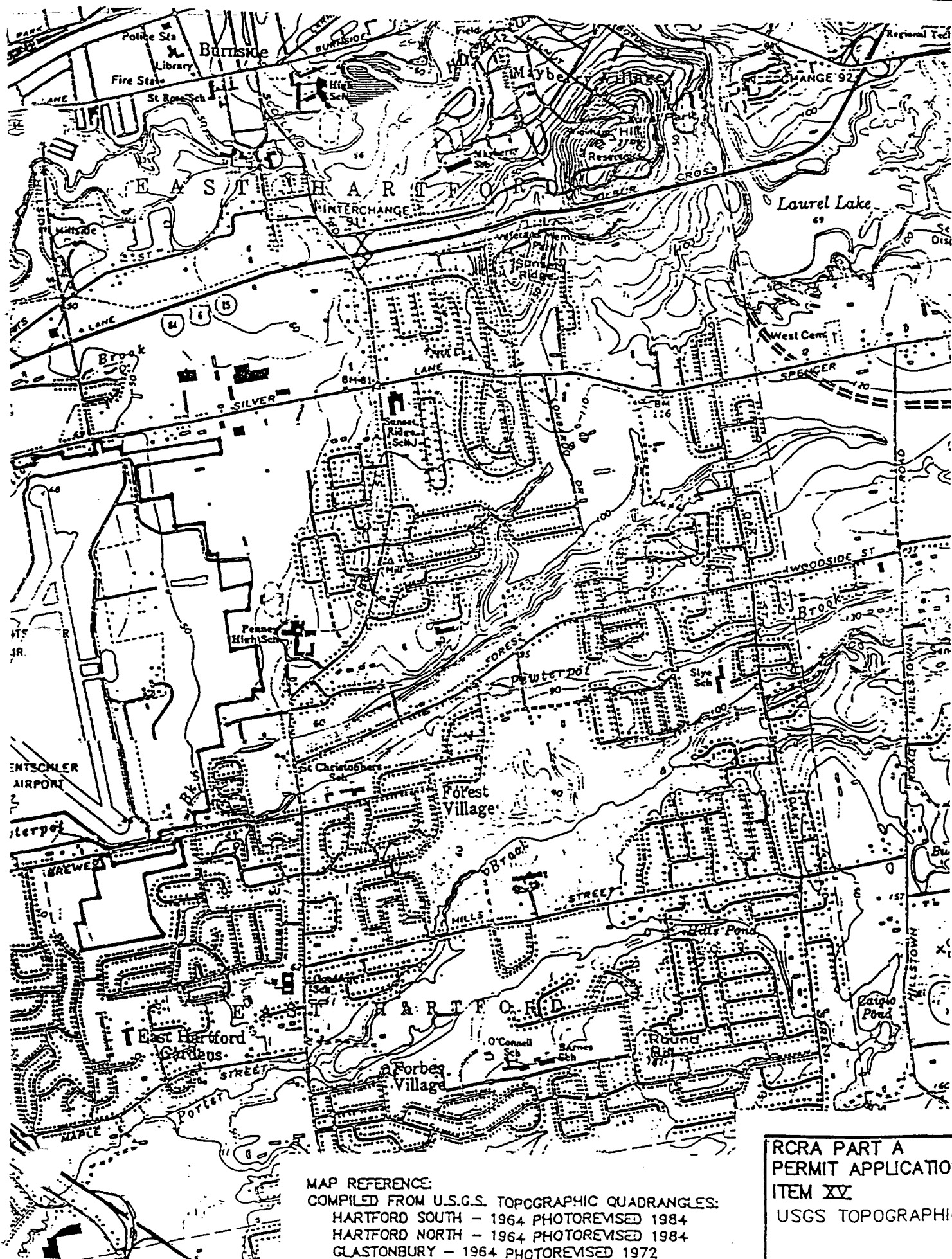
Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES	
				(1) PROCESS CODES (enter)	(2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D 0 3 2				Included with Line 10 on previous page
2	D 0 3 3				"
3	D 0 3 4				"
4	D 0 3 6				"
5	D 0 3 8				"
6	D 0 4 1				"
7	D 0 4 2				"
8	U 2 1 0	800*	Y	S 0 3	
9	U 2 2 0				Included with Line 8 above
10	U 2 2 6				Included with Line 8 above
11	U 2 2 8				Included with Line 8 above
12	U 2 3 9				Included with Line 8 above
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

* One-time short-term storage of contaminated soil.

EPA Form 3700-23 (01-90)

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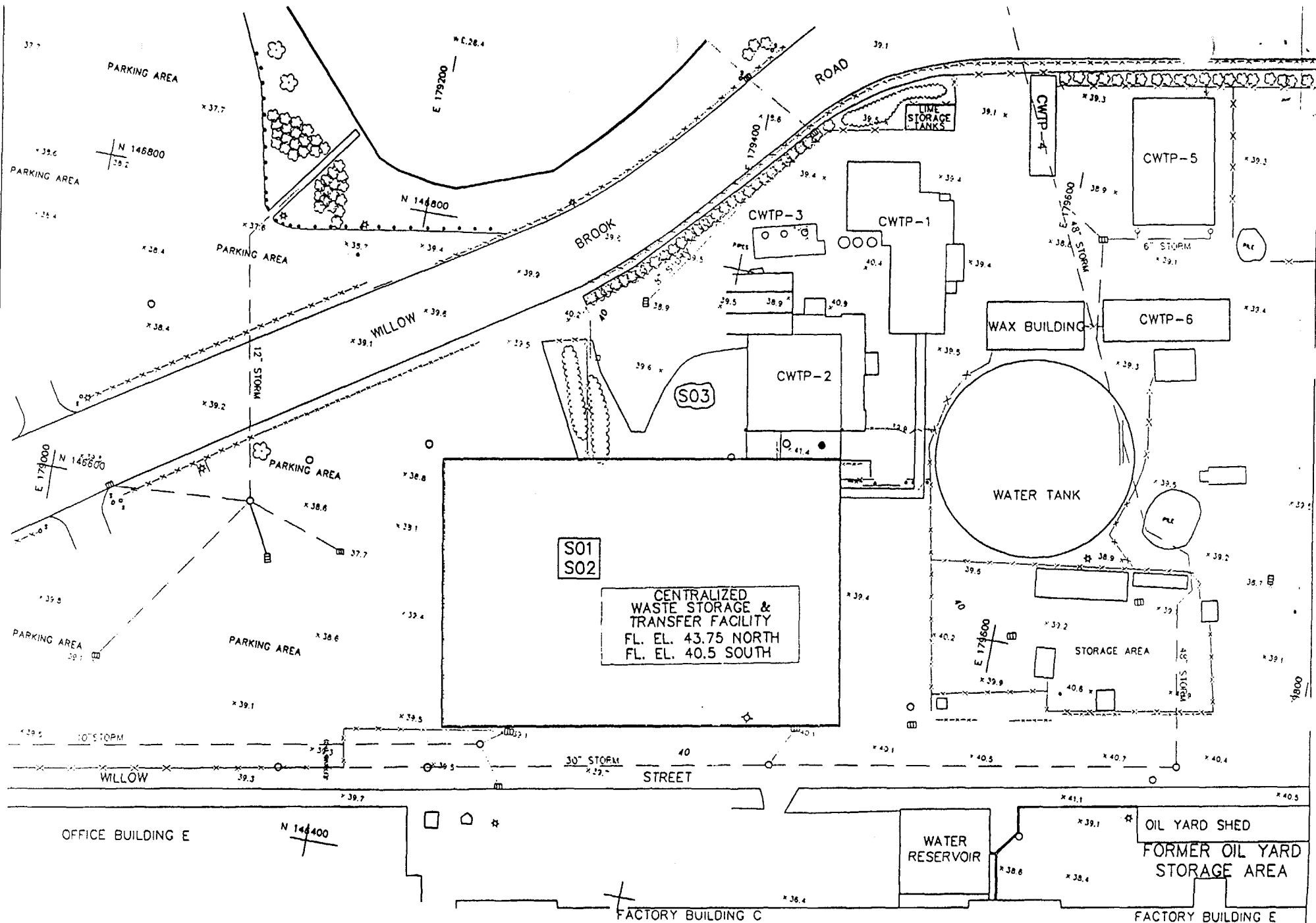
MAP REFERENCE:
COMPILED FROM U.S.G.S. TOPOGRAPHIC QUADRANGLES:
HARTFORD SOUTH - 1964 PHOTOREVISED 1984
HARTFORD NORTH - 1964 PHOTOREVISED 1984
GLASTONBURY - 1964 PHOTOREVISED 1972
MANCHESTER - 1963 PHOTOREVISED 1968

RCRA PART A
PERMIT APPLICATION
ITEM XV
USGS TOPOGRAPHIC MAP

SCALE: 1" = 2000'

[illegible]

SCALE: 1" = 800'



ITEM XVI B
 SCALE: 1" = 80'
 APRIL 1993

 **UNITED
 TECHNOLOGIES**
 PRATT & WHITNEY

APPENDIX D

Soil Vapor Sampling Information

SOIL VAPOR SAMPLING AND ANALYSIS PROCEDURES

Soil vapor samples were collected at designated stations, from one or more depths between 2.5 and 8.0 ft. Specific VOCs were sought, which included 1,1-dichloroethylene, 1,2-dichloroethylene, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, benzene, toluene, ethyl benzene, and xylenes. Instrument calibration was performed using mixed standards containing the specific analytes.

At each soil vapor sampling station, a sampling tube composed of 2.5 ft. long steel-pipe sections, joined by threaded connectors was driven to the desired depth using the percussion mode of the drill. Vapors were drawn from adjacent soil voids into the tube, through slots in the bottom pipe-section, using a vacuum pump. After approximately two minutes of pumping, a sample of the soil vapor was collected with a syringe, at a sampling port on the tube. The sample was then injected into the GC for analysis.

The drill bit and sampling tube were washed between sampling stations by laboratory-soap scrub, a tap water rinse, a methanol rinse and final tap water rinse. The syringe was purged with hydrocarbon-free air to remove prior-sample residue. Sampling tube and syringe blanks were analyzed between samples to verify that sampling equipment was not contaminated.

A Photovac Model 10S gas chromatograph was used for the analyses, under the following instrument conditions:

Detector	- 10.6 eV Photoionization Detector
Oven Temperature	- 40°C, isothermal
Carrier Gas and Flow Rate	- Hydrocarbon-free air, 7.5 ml/min
Column	- CPSil 5CB, capillary

The GC was calibrated at the beginning of the field day by injecting a headspace sample from atop aqueous standards containing known concentrations of the VOCs in solution. The instrument determines peak retention times (times elapsed between sample injection and peak appearances). Peak areas are integrated by the GC microprocessor. A response factor (the ratio of analyte concentration in the standard to chromatogram peak area), is calculated by the operator for each analyte. Standards were re-analyzed several times during the day to verify response factors and to recalibrate with respect to retention times.

A peak on a sample chromatogram is judged to correspond to a peak on a calibration chromatogram if respective retention times were within one second of each other. Similarities in calibration peak and sample peak shapes were also considered in identifying compounds. Concentrations of the VOCs sought are calculated by multiplying the peak areas on sample chromatograms by the corresponding response factors.

TABLE III

RESULTS OF SOIL VAPOR SURVEY (a)
SOUTH AIRPORT CLOSURE PLAN
18 AUGUST 1992

Pratt & Whitney Aircraft
East Hartford, CT

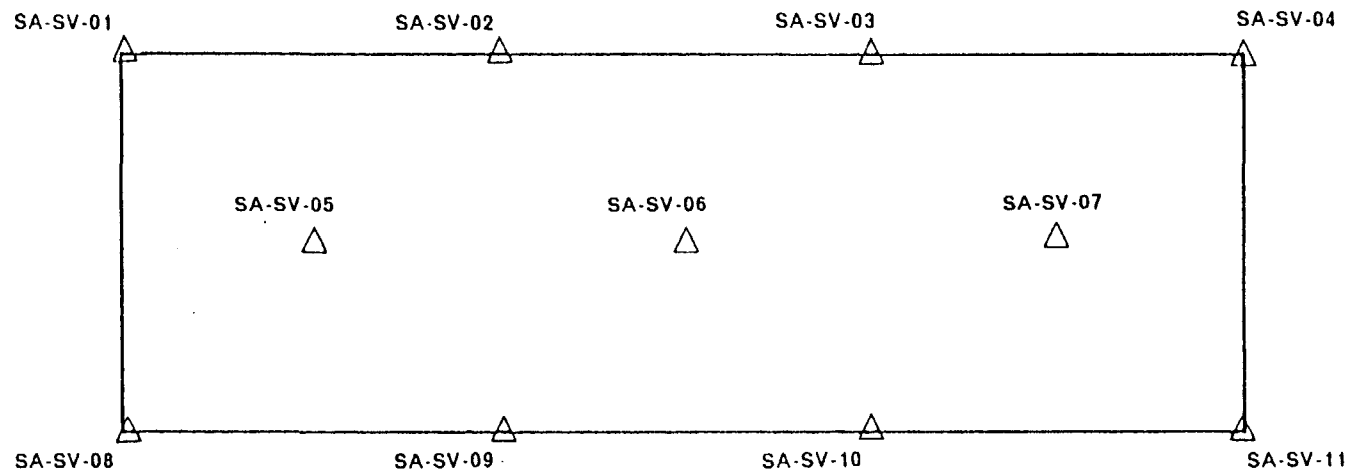
SAMPLE NO.	DEPTH (FT.)	CONCENTRATIONS (PARTS-PER-BILLION) (b)								
		1,1-DCE	1,2-DCE (c)	TCA	TCE	PCE	Benzene	Toluene	E. Benz.	Xylenes
SV-1	2.5-3.0	ND<1	4	ND<3	ND<1	9	ND<1	1	ND<1	ND<1
SV-2	2.5-3.0	ND<1	ND<1	ND<3	ND<1	11	ND<1	ND<1	ND<1	ND<1
SV-3	2.5-3.0	ND<1	ND<1	ND<3	ND<1	1	ND<1	ND<1	ND<1	ND<1
	7.5-8.0	ND<1	ND<1	ND<3	ND<1	2	ND<1	ND<1	ND<1	ND<1
SV-4	2.5-3.0	ND<1	ND<1	ND<3	ND>1	ND<1	ND<1	ND<1	ND<1	ND<1
SV-5	2.5-3.0	ND<1	ND<1	ND<3	ND<1	2	ND<1	ND<1	ND<1	ND<1
SV-6	2.5-3.0	ND<1	ND<1	ND<3	ND<1	1	ND<1	ND<1	ND<1	ND<1
SV-7	2.5-3.0	ND<1	ND<1	ND<3	ND<1	1	ND<1	ND<1	ND<1	ND<1
SV-8	2.5-3.0	ND<1	ND<1	ND<3	ND<1	1	ND<1	ND<1	ND<1	ND<1
SV-9	2.5-3.0	ND<1	ND<1	ND<3	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
	7.5-8.0	ND<1	ND<1	ND<3	ND<1	ND<1				
SV-10	2.5-3.0	ND<1	ND<1	ND<3	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
SV-11	2.5-3.0	ND<1	ND<1	ND<3	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
	7.5-8.0	ND<1	ND<1	ND<3	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1

NOTES:

- a. See Appendix B for a description of analytical methods.
- b. No entry (--) indicates that the compound was not detected at or above the reportable detection limits, which are as follows unless otherwise noted (in parts-per-billion).
- | | | | | | |
|------------------------------|---|-----------------------|---|-------------------------|---|
| 1,1-Dichloroethene (1,1-DCE) | 1 | Trichloroethene (TCE) | 1 | Toluene | 2 |
| 1,2-Dichloroethene (1,2-DCE) | 1 | Perchloroethene (PCE) | 1 | Ethylbenzene (E. Benz.) | 1 |
| 1,1,1-Trichloroethane (TCA) | 4 | Benzene | 1 | Xylenes | 1 |

The concentrations reported are in terms of concentration of VOC in an aqueous standard that would generate the observed level of VOC vapor in headspace above the standard.

- c. The concentrations reported for 1,2-DCE represent a sum of cis-1,2-DCE and trans-1,2-DCE.



LEGEND:

△ SA-SV-01
LOCATION AND DESIGNATION OF
SOIL VAPOR SAMPLE

NOTE:

1. LOCATIONS OF SOIL VAPOR SAMPLES ARE
ACCURATE TO WITHIN 5 FT.



Haley & Aldrich, Inc.
Consulting Geotechnical Engineers, Geologists and Hydrogeologists

PRATT & WHITNEY AIRCRAFT
SOUTH AIRPORT CLOSURE PLAN
EAST HARTFORD, CONNECTICUT

SOIL VAPOR SAMPLING LOCATIONS

SCALE: NTS

SEPTEMBER 1992

APPENDIX E

Standard Operating Procedures

**Standard Operating Procedure
for
Liquid Sample Collection and Field Analysis**

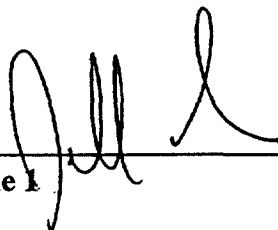
SOP ID: 10004

Date Initiated: 2/20/90

Revision #003 : 11/20/96

Approved By:

Name 1



Date

11/20/96

Name 2

Gail L. Batchelder

Date

11/20/96

LOUREIRO ENGINEERING ASSOCIATES

Standard Operating Procedure For Liquid Sample Collection and Field Analysis

1.0 Statement of Purpose

This document describes procedures to be followed for measurement of static water level elevations, detection of immiscible layers, well evacuation, sample withdrawal, and field analyses.

2.0 Equipment

2.1 Equipment required for the collection and field analysis of liquid samples shall include:

- water-level indicator (accurate to 0.01 foot)
- distilled water
- hand towels
- portable VOC analyzer (Photovac Microtip®, Foxboro OVA® or equivalent)
- interface probe, clear pvc or fluorocarbon resin bailer
- pH and temperature meter (capable of accuracy to 0.1 pH unit)
- specific conductance meter
- two-inch diameter, PVC fluorocarbon resin or stainless steel bailers (clean) with disposable nylon rope
- polyethylene plastic sheeting
- centrifugal pump with fluorocarbon resin foot valve or equivalent
- peristaltic pump and polyethylene tubing
- clean disposable gloves
- 5-gallon bucket(s)

3.0 Sample Collection

3.1 Measurement of Static Water Level

- 3.1.1 The static water elevations in each well shall be measured prior to each sampling event. This is performed initially to characterize the site, and in subsequent sampling rounds to determine whether horizontal or vertical flow

gradients have changed. A change in hydrologic conditions may necessitate modification of the groundwater monitoring program.

- 3.1.2 Each well shall have a surveyed reference point located at the top of the well casing with the locking cap removed. The reference point shall be easily recognizable, since the personnel conducting the sampling may differ from one sampling event to the next.
- 3.1.3 The following parameters shall be measured with an accuracy of ± 0.01 ft:
 - depth to standing water
 - depth to bottom of well
- 3.1.4 A water-level indicator with a fiberglass tape will be used for measurement. Due to possible pressure differences between the well atmosphere and the ambient atmosphere, the water level will be allowed fifteen minutes to equilibrate upon removal of the well cap. The results shall be recorded on the appropriate field form(s).
- 3.1.5 Total depth measurements will be compared to original depths to determine the degree of siltation that may have occurred. This information shall be noted on the field form. Should significant siltation occur in any well, the well shall be redeveloped by an approved method.
- 3.1.6 The portion of the tape immersed in the well shall be decontaminated during retrieval using a distilled water rinse followed by drying with a clean wipe, prior to use in another well. This decontamination procedure shall be amended, as needed, to accommodate the specific type of contamination needed.

3.2 Field Analysis

- 3.2.1 Parameters that are physically or chemically unstable shall be tested immediately after collection using a field test kit or other equipment. Such parameters as pH, temperature, and specific conductance will be measured in the field, at the temperature of the well sample.
- 3.2.2 A standard pH meter with a glass or polymer-body electrode (Orion pH Meter model SA 250 or equivalent) shall be used. The meter shall be calibrated prior to use using two buffer solutions, in accordance with the instructions of the manufacturer of the meter. Calibration shall be checked

using the two buffer solutions prior to sampling each well. Calibration information to be recorded in the field log will be the temperature and pH readings in each buffer before and after each calibration. The date the buffer was prepared shall also be noted in the field notebook.

The temperature and pH probes shall be placed into a sample and allowed to stabilize for a minimum of twenty seconds. The accuracy of measurement shall be 0.1 pH units and 0.1° Celsius. The sample shall be discarded in an appropriate manner upon completion of analysis.

- 3.2.3 Specific conductance will be measured using Cole-Parmer Conductivity Meter model 1481-55 or equivalent that has been calibrated in accordance with the instructions provided by its manufacturer. Calibration shall be performed prior to each sampling event and checked after each day of sampling.

The specific conductance probe shall be added to the sample container following measurement of the pH and temperature. The conductance meter will be adjusted for the temperature of the sample. Twenty seconds shall be allowed for stabilization prior to obtaining a reading. Accuracy shall be as stipulated by the range of the instrument.

- 3.2.4 These probes shall be decontaminated using a distilled/deionized water rinse between each sample. To the extent possible, the same probe and meter shall be used for all measurements at a given site for the duration of monitoring at the site.

3.3 Detection of Immiscible Layers

- 3.3.1 Should evidence warrant, a sampling event shall include provisions for detection of immiscible phases prior to well evacuation or sample collection. Light non-aqueous phase liquids (LNAPLs) are relatively insoluble liquid organic compounds with densities less than that of water (1 g/ml), while dense non-aqueous phase liquids (DNAPLs) are organic compounds with densities greater than that of water. Lighter and/or denser immiscible phases may be encountered in a groundwater monitoring well.
- 3.3.2 Remove the protective cover and locking cap.
- 3.3.3 The air in the well head will be sampled for volatile organic compounds (VOCs) using a portable VOC analyzer, such as a Photovac Microtip®. The

instrument shall be zeroed with ambient air prior to the measurement, and the initial and final readings shall be recorded for each well.

- 3.3.4 An interface probe will be used to determine the existence of any immiscible layers, light or dense. Alternatively, a clear fluorocarbon resin or PVC bailer may be used to determine the existence of the phases or oil sheen in the well when no accurate determination of the immiscible layer thickness is required.
- 3.3.5 Should elevations of the immiscible layers be required, levels of the fluids shall be measured to an accuracy of 0.02 feet using an electronic interface probe capable of detecting the interfaces between air, product, and water. The interface levels shall be recorded in the field notebook. Adjustments of the observed head to the theoretical hydraulic head shall be calculated based on the density conversion factor associated with the particular non-aqueous phase liquid.
- 3.3.6 The immiscible layers and groundwater shall then be purged into 55-gallon 17H DOT drum which shall be labeled and characterized for disposal.

3.4 Well Evacuation

- 3.4.1 Calculate standing water in the well based on the following schedule and record on the appropriate field form:

Well Diameter (inches)	Conversion Factor (gal/feet)
2	0.163
4	0.654
6	1.47

- 3.4.2 Don disposable gloves, remove bailer from plastic bag, and attach nylon rope of sufficient length to reach the bottom of the well.
- 3.4.3 Lower the bailer gently into the water column and withdraw, being careful not to allow the rope or bailer to touch the unprotected ground.
- 3.4.4 Measure pH, temperature and specific conductance in the well from the first bailer extracted prior to purging.
- 3.4.5 Remove a volume of water equal to 3 to 5 times the standing water from the well measured in a 5-gallon bucket.

- 3.4.6 A new piece of polyethylene plastic shall be placed on the ground adjacent to the well. Sampling and purging equipment, such as bailers and bailer twine, pumps, containers, etc., shall be placed on the polyethylene sheet, never on the ground.
- 3.4.7 If it is not possible to remove three volumes as described above, due to slow recovery of the well, the well shall be emptied and allowed to recover. Samples obtained from slow-yielding wells shall be extracted as soon as a sufficient volume is available for a sample for each parameter.
- 3.4.8 Measure pH, temperature, specific conductance prior to sampling.
- 3.4.9 Well evacuation is deemed to be complete when the following criteria have been met:
- pH measurements vary no more than 0.5 units
 - specific conductance measurements vary no more than $\pm 10\%$
 - temperature measurements vary no more than $\pm 1^\circ$
 - turbidity measurements (if used) are below 5 ntu, if practicable
- or a maximum of five well volumes have been removed from the well
- 3.4.10 Measure pH, temperature, specific conductance again after sampling to determine effectiveness of purging and sample stability.
- 3.4.11 Do not re-use purging equipment (bailers, rope, sampling vials, etc.). Bailers shall be returned to the office and decontaminated for future use (detailed bailer washing procedures described elsewhere in this manual).
- 3.4.12 Bailer twine and other consumables, such as filter apparatus, shall be disposed of appropriately.
- 3.4.13 Record sampler's name, sampling time, volume of water purged, parameters measured, weather conditions, sample number, analyses required and all other pertinent information in field notebook, and appropriate field forms, and complete the chain of custody form.
- 3.4.14 Alternatively, a centrifugal pump, peristaltic pump or equivalent, equipped with a fluorocarbon resin or PVC foot valve on the end of dedicated tubing may be used at shallow depths to evacuate the monitoring wells.

3.4.15 If any indication that the water purged is or may be hazardous, store the liquid until the appropriate laboratory analyses are available, then dispose of it according to all applicable local, state and federal requirements.

3.4.16 Storage shall be in containers approved for storage of hazardous materials, and in an appropriate designated location at the facility.

3.5 Sample Withdrawal

3.5.1 In order to ensure that the groundwater sample is representative of the formation, it is important to minimize physical alteration (i.e. agitation during purging and/or sample collection) or chemical contamination of the sample during the withdrawal process. The sample set shall include enough dedicated bailers to obtain samples from each well, plus 10%.

3.5.2 Use a PVC, fluorocarbon resin or stainless steel bailer to purge each well (the same bailer used for purging may be used for sample withdrawal). Do not reuse a bailer in the field; used bailers shall be returned to the office for decontamination.

3.5.3 Samples shall be collected in the following order into pre-labeled sample containers:

- Volatile organic compounds (VOCs)
- Purgeable organic carbon (POCs)
- Purgeable organic halogens (POX)
- Total organic halogens (TOX)
- Total organic carbon (TOC)
- Extractable organics (semi-volatile)
- Metals
- Phenols
- Cyanide
- Chloride and sulfate
- Nitrate and ammonia
- Turbidity
- Radionuclides

3.5.4 Samples shall be obtained from the monitoring wells as soon as possible after purging. This may require waiting an extended period for low-yielding wells.

- 3.5.5 Samples collected for VOC analysis shall be free of any air bubbles and inverted upon filling. Bacterial samples shall be collected using dedicated gloves; taking care not to allow anything to touch the inside of the sampling container.
- 3.5.6 Samples collected for metals analysis shall be filtered in the field through 0.45 micron (maximum) membrane filter under negative pressure.
- 3.5.7 In situations where replicate samples shall be required, care shall be taken to ensure that each sample collected is independent.
- 3.5.8 In some situations, inorganic parameters may be sampled directly from a pump after completion of well evacuation procedures.

3.6 Field Documentation

- 3.6.1 Field documentation shall include at a minimum: a chain-of-custody form, field log notebook, Field Data Record Groundwater Form, Sample Collection Form, Daily Field Report, Field Quality Review Checklist. Sample labels and sample seals shall be used for proper sample identification.
 - 3.6.1.1 The labels shall be sufficiently durable to withstand immersion for 48 hours without detaching and to withstand normal handling. The information provided shall be legible at all times.
 - 3.6.1.2 The following information shall be provided on the sample label using an indelible pen:
 - Sample identification number
 - Date and time of collection
 - Place of collection
 - Name of collector
 - Parameter(s) requested (if space permits)
 - 3.6.1.3 A field logbook and/or appropriate field forms will be used to log all pertinent information with an indelible pen. The following information shall be provided:
 - Identification of well
 - Static water level measurement technique
 - Presence of immiscible layers and detection method

- Well yield - high or low
- Time well purged
- Collection method for immiscible layers and sample identification numbers
- Well evacuation procedure/equipment
- Sample withdrawal procedure/equipment
- Date and time of collection
- Types of sample containers used and sample identification numbers
- Preservative(s) used
- Parameters requested for analysis
- Field analysis method(s)
- Field observations on day of sampling event
- Name of collector
- Climatic conditions, including air temperature
- Internal temperature of field and shipping (refrigerated) containers

3.6.1.4 The Field Sampling Record shall include at a minimum the following information:

- Identification of well
- Date and time of collection
- Field analysis data and method(s)
- Name of collector
- Sample number

3.6.1.5 The chain-of-custody record shall include the following information:

- Company's name and location
- Date and time of collection
- Sample number
- Container type, number, size
- Preservative used
- Signature of collector
- Signatures of persons involved in the chain of possession
- Analyses to be performed

3.6.1.6 The Field Data Record Groundwater Form shall be updated during the sampling of each well and include the following information:

- Identification of well
- Well depth, elevation of casing and riser, diameter depth to water, water table elevation
- Static water level depth and measurement technique
- Purge volume and pumping rate
- Time well purged
- LEA commission number
- Date
- Project and site location
- Inspectors and time of inspection
- Record of non-productive time
- Type and number of samples, total number of sample bottles, and sampling method
- Status of total production
- Record of site activities

3.6.1.7 The Field Quality Review Checklist shall assure the completeness of the sampling round and include the following information:

- Reviewer's name, date, and LEA commission number
- Review of all necessary site activities and field forms
- Statement of corrective actions for deficiencies

**Standard Operating Procedure
for
Quality Assurance/Quality Control Measures
for
Field Activities**

SOP ID: 10005

Date Initiated: 2/20/90

Revision #003: 06/12/97

Approved By:

Name 1

Date

Name 2

Date

LOUREIRO ENGINEERING ASSOCIATES

Standard Operating Procedure For Quality Assurance/Quality Control Measures For Field Activities

1. Statement of Purpose

This document describes procedures to be followed for proper Quality Assurance Quality Control (QA/QC) practices which shall incorporate all activities associated with sampling tool and instrument preparation, field measurements and sampling, proper documentation of field and post-field activities, QC sample preparation, chain-of-custody protocol and laboratory analytical procedures. The use of specific QA/QC measures shall be dependent upon the goals of a particular project and shall be stated in the site specific work plan. This SOP was adopted in accordance with the EPA document "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)".

1.1. General

1.1.1. All QA/QC sample preparation procedures shall be properly documented including:

- Name of person(s) or laboratory involved in sample preparation
- Reagents used
- Sample number
- Analyses required
- Concentration calculations
- Accuracy of measurements
- Number, type, size of containers used
- Preservation method
- Date and time of sample preparation

1.1.2. All information shall be included in the field logbook, but not necessarily in the chain-of-custody record except as needed for proper sample identification and analysis. No information that would identify the sample as a QA/QC sample shall be included in the chain-of-custody record.

1.1.3. At the conclusion of each sampling day, a quality control review shall be conducted using the Field Quality Review Checklist and the Daily Field Report.

2. QC Sample Preparation

2.1. Trip Blank

- 2.1.1. Contaminated trip blanks may indicate contamination of the samples during the field trip or shipment to the lab, cross-contamination between the samples, contaminated sample vials, or improper handling.
- 2.1.2. Trip blanks shall be used only with samples that are to be analyzed for volatile organic compounds.
- 2.1.3. One trip blank shall be included per shipping container (cooler) carrying sample soil and/or groundwater samples that are to be analyzed for volatile organic compounds
- 2.1.4. Trip blanks are prepared using analyte-free deionized water prior to field activities associated with the sampling event, usually by the laboratory providing the sampling containers. Each trip blank is placed in a 40-ml glass VOA vial and is carried in the same shipping container as the sample(s). Trip blanks should not be opened at any time during transport.

2.2. Equipment/Rinsate Blank

- 2.2.1. The purpose of an equipment/rinsate blank is to determine if decontamination procedures were adequate or if any of the equipment might contribute contaminants to the sample.
- 2.2.2. An equipment/rinsate blank is prepared by running analyte-free deionized water through all sample collection equipment (bailers, pumps, filters, split spoon) and placing it in the appropriate sample containers for analysis. If equipment has been decontaminated in the field, the equipment/rinsate blank should be collected after decontamination procedures have been performed.
- 2.2.3. Equipment/rinsate blanks shall be used when sampling surface water, groundwater, soil, and sediment.
- 2.2.4. One equipment/rinsate blank shall be collected for each sample bottle/preservation technique/analysis procedure per matrix per sampling event.

2.3. Replicate Samples

- 2.3.1. Replicate samples provide precision information on handling, shipping, storage, preparation and laboratory analysis.
- 2.3.2. Replicate samples are samples that have been divided into two or more portions in the field. An example of a replicate sample is two identical sample bottles filled with water from the same bailer retrieval. To ensure homogeneity, the bailer should be emptied into a clean, decontaminated beaker used exclusively for the purpose and containing sufficient volume for both sample containers, and from that into the sample containers.
- 2.3.3. Replicate samples can not be used when sampling for volatile organic compounds.
- 2.3.4. One replicate sample shall be obtained for each sample bottle/preservation technique/analysis procedure per sampling event or one out of every 20 samples, unless collocated samples are used (see below).

2.4. Collocated Samples

- 2.4.1. Collocated samples provide precision information on sample acquisition, homogeneity, handling, shipping, storage, preparation and laboratory analysis.
- 2.4.2. Collocated samples are independent samples collected in such a way so that presumably they are equally representative of the parameter of interest. Examples of collocated samples are groundwater samples collected sequentially, soil core samples collected side-by-side, or air samples collected essentially at the same time from the same manifold.
- 2.4.3. Collocated samples are especially useful when sampling for volatile organic compounds, for which replicate samples cannot be used.
- 2.4.4. Collocated samples shall be obtained for each sample bottle/preservation technique/analysis procedure per sampling event or one out of every 20 samples, unless replicate samples are used (see above).

2.5. Split Samples

- 2.5.1. The purpose of split samples is to provide an assessment of the laboratory analytical procedure.

- 2.5.2. Split samples are collocated or replicate samples sent to two (or more) different laboratories.
- 2.5.3. Split samples can be used with any sample media. Split samples can be used in conjunction with spiked samples (see below). In case contradictory results are obtained from the samples split between different laboratories, the spiked samples can be used to verify the analytical data (provided that the spiked samples were properly prepared and the appropriate documentation is available).
- 2.5.4. When used, one split/spiked sample per sample bottle/preservation technique/analysis procedure per sampling event or every 20 samples shall be included.

2.6. Spiked Samples

- 2.6.1. The purpose of spiked samples is to provides information on the precision of the laboratory analytical procedure. However, besides a wrong preparation, several other sources of error exist such as analyte stability, holding time and interactions with the sample matrix.
- 2.6.2. Spiked samples are samples spiked with the contaminants of interest. The compounds used for spiking should be of the same chemical group as the contaminants being investigated, but they do not have to be the exact chemical compounds. Spiking should be carefully designed and performed prior to the field investigations. Field matrix spikes are not generally recommended because of the high level of technical expertise required for proper preparation and documentation.
- 2.6.3. Can be used with any sample media, however, liquid matrices are preferred due to uniformity of mixing.
- 2.6.4. When used, one split/spiked sample per sample bottle/preservation technique/analysis procedure per sampling event or every 20 samples shall be included.

**Standard Operating Procedure
for
Soil Sampling**

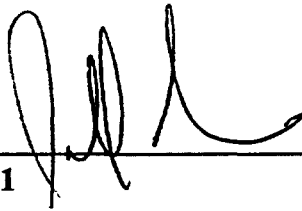
SOP ID: 10006

Date Initiated: 2/20/90

Revision #003: 11/21/96

Approved By:

Name 1



Date

11/21/96

Name 2

Gail T. Batchelder

Date

11/21/96

LOUREIRO ENGINEERING ASSOCIATES

Standard Operating Procedure for Soil Sampling

1.0 Statement of Purpose

This document discusses procedures for collection of soil samples for analytical analysis. Methods for collection and quality assurance/quality control requirements are covered under separate SOPs. The procedures outlined in this document are in accordance with ASTM Standard D 420 and the EPA document Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). These procedures may vary slightly according to the needs of specific projects.

2.0 Equipment

2.1 Equipment required for the collection of soil samples shall include:

- Stainless steel spatula
- Distilled water
- Hand towels
- Polyethylene plastic sheeting
- Sample collection jars
- Clean disposable gloves
- Field documentation
- Indelible marker
- Cooler, cold packs and maximum/minimum thermometer
- Custody seals and sample labels
- Polythethylene plastic sheeting (5-mil thickness)

2.2 Cleaning and Decontamination

- 2.2.1** Prior to conducting a boring, the LEA representative will ensure that all necessary sampling equipment is clean and decontaminated according to the site-specific work plan or collection method SOPs.

- 2.2.2 Upon completion of all sampling requirements and prior to leaving the site, all equipment used for sampling shall be cleaned and decontaminated. All generated decontamination fluids shall be disposed of in accordance with the site-specific work plan and all municipal, state, and federal requirements.

3.0 Sampling Protocols

3.1 Preliminary Sampling Procedures

3.1.1 Sample Bottles

- 3.1.1.1 A Laboratory Request Form shall be completed and submitted to the laboratory with following information:

- Project name
- LEA commission number
- Date of submittal and date needed
- Quantity of sample locations and sample points at each location
- Type(s) of samples
- Analytes, detection limits and QA/QC needed
- Cooler(s) required
- Number of Chain-of-Custody forms requested

- 3.1.1.2 Check bottles against Laboratory Request Form for completeness. The bottles should also be checked for damage and cleanliness. Confirm with laboratory personnel the adequacy of the preservatives used.

- 3.1.1.3 Label all bottles prior to sampling with the information and check for accuracy. This step may also be performed in the field prior to sample collection.

- 3.1.1.4 The total number of sample sets shall be increased by 10% to allow for possible breakage during transport to sites or other contingencies (minimum: one additional sample bottle set per event).

- 3.1.1.5 A cooler with adequate ice or cold packs should be obtained from the laboratory to insure that the collected samples remain at 4°C during transport. Packing material should also be obtained to insure against breakage during transport.

3.1.2 Site Preparation

- 3.1.2.1 A level table shall be placed within the exclusion zone and covered with polyethylene sheeting.
- 3.1.2.2 Decontaminated spatulas shall be wrapped in aluminum foil and placed on the table. Prelabeled sample bottles shall be placed in a convenient location and in order of sample collection.

3.2 Sampling Procedures

- 3.2.1 All personal protective equipment (PPE) should be donned and maintained in accordance with the site-specific work plan or health and safety plan during all sampling procedures. In the event that no PPE has been specified for a particular sampling event, disposable latex gloves should be donned, as a minimum, during all sampling procedures.
- 3.2.2 The particular soil sampling device (i.e. hand auger, split spoon, etc.) shall be retrieved from the point of collection and placed on a level table covered in polyethylene sheeting.
- 3.2.3 Using a decontaminated stainless steel spatula, the soil shall be transferred directly into a prelabeled soil sampling container. Care should be taken to completely fill the sample container. Large void spaces within the container shall be minimized by packing, not agitation.
- 3.2.4 Wipe the rim of the sample container with a clean paper towel to remove excess solids which would prevent adequate sealing of the sample container and seal the container.
- 3.2.5 Affix a custody seal, noting the date and time of collection across the cap/bottle interface and on the sample label. Place and secure sample within cooler and complete all sample collection documentation.

3.3 Post-Sampling Procedures

- 3.3.1 Upon completion of all sampling procedures for a particular site, secure the lid of the cooler using packaging tape with the Chain-Of-Custody inside.
- 3.3.2 Should the laboratory be local, transport the samples directly to the laboratory and present them to the sample manager. The representative of LEA should witness the verification of the Chain-Of-Custody and obtain a carbon copy for filing in the project notebook.
- 3.3.3 Should the laboratory be distant, arrange for transport with a reputable carrier service. The cooler and samples shall be secured for transport, and all mailing documentation secured onto the top of the cooler. Unless otherwise specified, delivery shall be overnight. A request for confirmation of acceptance should be made to the carrier at the time of pick-up.

3.4 Documentation

- 3.4.1 The following general information shall be recorded in the field log book and/or on the appropriate field forms:
- Site identification
 - LEA commission number
 - Site location
 - Name of recorder
 - Identification of borings
 - Collection method
 - Date and time of collection.
 - Types of sample containers used, sample identification numbers and QA/QC sample identification
 - Preservative(s) used
 - Parameters requested for analysis
 - Field analysis method(s)
 - Field observations on sampling event
 - Name of collector
 - Climatic conditions, including air temperature
 - Internal temperature of field and shipping (refrigerated) containers
 - Chronological events of the day
 - QA/QC data

3.4.2 The following information shall be recorded on the Field Quality Review Checklist:

- Reviewer's name, date, and LEA commission number
- Review of all necessary site activities and field forms
- Statement of corrective actions for deficiencies

3.4.3 The following information shall be recorded on the chain-of-custody record:

- Client's name and location
- Boring or sampling location identification
- Date and time of collection
- Sample number
- Container type, number, size
- Preservative used
- Signature of collector
- Signatures of persons involved in the chain of possession
- Analyses to be performed

3.4.4 The following information shall be provided on the sample label using an indelible pen:

- Sample identification number
- Name of collector
- Date and time of collection
- Place of collection
- Parameter(s) requested (if space permits)

3.4.5 The following information shall be recorded on the sample collection data sheet:

- Client name, location and LEA commission number
- Boring or sampling location identification number
- Date and time of collection
- Sample number
- Depth sample was obtained
- VOC reading

**Standard Operating Procedure
for
Geoprobe® Probing and Sampling**

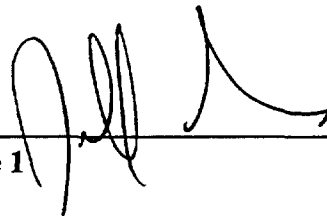
SOP ID: 10011

Date Initiated: 11/10/94

Revision #002: 11/20/96

Approved By:

Name 1



Date
11/20/96

Name 2

Gail L. Batchelder

Date
11/20/96

LOUREIRO ENGINEERING ASSOCIATES

Standard Operating Procedure for Geoprobe® Probing and Sampling

1.0 Statement of Purpose

The objective of this procedure is to collect a discrete soil sample at depth using Geoprobe® probing and sampling methodologies and to recover the sample for visual inspection and/or chemical analysis. Procedures for soil sampling for chemical analysis are included in *Standard Operating Procedures for Soil Sampling*.

2.0 Background

2.1 Definitions

Geoprobe® *: A vehicle-mounted, hydraulically-powered, soil probing machine that utilizes static force and percussion to advance small diameter sampling tools into the subsurface for collecting soil core, soil gas, or groundwater samples.

* (Geoprobe is a registered trademark of Kejr Engineering, Inc., Salina, Kansas.)

Large Bore Sampler: A 24-inch long x 1-3/8-inch diameter piston-type soil sampler capable of recovering a discrete sample that measures up to 320 ml in volume, in the form of a 22-inch x 1-1/16-inch core contained inside a removable liner.

Liner: A 24-inch long x 1-1/8-inch diameter removable/replaceable, thin-walled tube inserted inside the Large Bore Sampler body for the purpose of containing and storing soil samples. Liner materials include brass, stainless steel, Teflon®, and clear plastic (either PETG or cellulose acetate butyrate).

2.2 Discussion

In this procedure, the assembled Large Bore Sampler is connected to the leading end of a Geoprobe® brand probe rod and driven into the subsurface using a Geoprobe® machine. Additional probe rods are connected in succession to advance the sampler to depth. The sampler remains sealed (closed) by a piston tip as it is being driven. The piston is held in place by a reverse-threaded stop-pin at the trailing end of the sampler. When the sampler tip has reached the top of the desired sampling interval,

a series of extension rods, sufficient to reach depth, are coupled together and lowered down the inside diameter of the probe rods. The extension rods are then rotated clock-wise (using a handle). The male threads on the leading end of the extension rods engage the female threads on the top end of the stop-pin, and the pin is removed. After the extension rods and stop-pin have been removed, the tool string is advanced an additional 24 inches. The piston is displaced inside the sampler body by the soil as the sample is cut. To recover the sample, the sampler is recovered from the hole and the liner containing the soil sample is removed.

3.0 Required Equipment

The following equipment is required to recover soil core samples using the Geoprobe® Large Bore Sampler and driving system. Sample liners for the Large Bore Sampler are available in four different materials. Liner materials should be selected based on sampling purpose, analytical parameters, and data quality objectives.

<u>Large Bore Sampler Parts</u>	<u>Part Number</u>
STD Piston Stop-pin, O-ring	AT-63, 63R
LB Cutting Shoe	AT-660
LB Drive Head	AT-661
LB Sample Tube	AT-662
LB Piston Tip	AT-663
LB Piston Rod	AT-664
LB Clear Plastic Liner	AT-665
LB Brass Liner	AT-666
LB Stainless Steel Liner	AT-667
LB Teflon® Liner	AT-668
LB Cutting Shoe Wrench	AT-669
Vinyl End Caps	AT-641
Teflon® Tape	AT-640T

<u>Geoprobe® Tools</u>	<u>Part Number</u>
Probe Rod (3 foot)	AT-10B
Probe Rod (2 foot)	AT-10B
Probe Rod (1 foot)	AT-10B
Drive Cap	AT-11B
Pull Cap	AT-12B
Extension Rod	AT-67
Extension Rod Coupler	AT-68
Extension Rod Handle	AT-69

<u>Optional</u>	<u>Part Number</u>
LB Manual Extruder	AT-659K
Extension Rod Jig	GS-469
LB Pre-Probe	AT-146B

Additional Tools

Vise Grips

Open Ended Wrench (3/8-inch)

1-inch or Adjustable Wrench

4.0 Procedures

4.1 Utilities Clearance

- 4.1.1 Notify the appropriate "one call" utility notification service (e.g. Call Before You Dig) at least three working days prior to commencing operations on a site. The locations of all proposed borings must be clearly marked in the field prior to notification.
- 4.1.2 Particularly upon larger private sites, consult with the owner or other person knowledgeable about the site as to locations of potential private or abandoned utilities and locate these prior to beginning work. Upon the discretion of the project manager, a pipe locator can also be used to assist in locating utilities.

4.1.3 Note that OSHA may have additional requirements for location of utilities.

4.1.4 All efforts to locate underground utilities should be properly documented in the field log book prior to onset of the work scheduled.

4.2 OSHA

The foreman or supervisor of the drilling crew shall be the Competent Person as required by OSHA for all of their work. However, this does not relieve the LEA representative from bringing to his or her attention conditions which may be unsafe or present a hazard to the drilling crew, the general public, or other workers on the site. The LEA representative is responsible for ensuring that LEA activities are conducted in accordance with the site-specific Health and Safety Plan.

4.3 Site Preparation

4.3.1 A sufficient area shall be cordoned off to restrict access to the work area. This area shall be termed an "Exclusion Zone".

4.3.2 An equipment decontamination area shall be assembled as described in Section 4.11 within the exclusion zone.

4.3.3 The area immediately surrounding the proposed borehole and the back portion of the rig (including the tires) shall be covered with 5 mil plastic sheeting. A hole of sufficient diameter shall be cut from the center of the plastic sheeting to facilitate auger advancement.

4.3.4 All personal protective equipment shall be donned.

4.4 Assembly

4.4.1 Install a new AT-63R)-ring into the O-ring groove on the AT-63 Stop-pin.

4.4.2 Seat the pre-flared end of the LB Liner (AT-665, -666, -667, or -668) over the interior end of the AT-660 Cutting Shoe. It should fit snugly.

4.4.3 Insert the liner into either end of the AT-662 Sample Tube and screw the cutting shoe and liner into place. If excessive resistance is encountered during this task, it may be necessary to use the AT-669 LB Shoe Wrench. Place the wrench on the ground and position the sampler assembly with the shoe end down so that the recessed notch on the cutting shoe aligns with the

pin in the socket of the wrench. Push down on the sample tube while turning it, until the cutting shoe is threaded tightly into place.

- 4.4.4 Screw the AT-664 Piston Rod into the AT-663 Piston Tip. Insert the piston tip and rod into the sample tube from the end opposite the cutting shoe. Push and rotate the rod until the tip is seated completely into the cutting shoe.
- 4.4.5 Screw the AT-661 Drive Head onto the top end of the sample tube, aligning the piston rod through the center bore.
- 4.4.6 Screw the reverse-threaded AT-63 Stop-pin in the top of the drive head and turn it **counter-clockwise** with a 3/8-inch wrench until tight. Hold the drive head in place with a 1-inch or adjustable wrench while completing this task to assure that the drive head stays completely seated. The assembly is now complete.

4.5 Pilot Hole

A pilot hole is appropriate when the surface to be penetrated contains gravel, asphalt, hard sands, or rubble. Pre-probing can prevent unnecessary wear on the sampling tools. A Large Bore Pre-Probe (AT-146B) may be used for this purpose. The pilot hole should be made only to a depth above the sampling interval. Where surface pavements are present, a hole may be drilled with the Geoprobe® using a Drill Steel (AT-32, -33, -34, or -35, depending upon the thickness of the pavement), tipped with a 1.5-inch diameter Carbide Drill Bit (AT-36) prior to probing. For pavements in excess of 6 inches, the use of compressed air to remove cuttings is recommended.

4.6 Driving

- 4.6.1 Attach an AT-106B 1-foot Probe Rod to the assembled sampler and an AT-11B Drive Cap to the probe rod. Position the assembly for driving into the subsurface.
- 4.6.2 Drive the assembly into the subsurface until the drive head of the LB sample tube is just above the ground surface.
- 4.6.3 Remove the drive cap and the 1-foot probe rod. Secure the drive head with a 1-inch or adjustable wrench and re-tighten the stop-pin with a 3/8-inch wrench.
- 4.6.4 Attach an AT-105B 2-foot Probe Rod and a drive cap, and continue to drive the sampler into the ground. Attach AT-10B 3-foot Probe Rods in succession

until the leading end of the sampler reaches the top of the desired sampling interval.

4.7 Preparing to Sample

- 4.7.1 When sampling depth has been reached, position the Geoprobe® machine away from the top of the probe rod to allow room to work.
- 4.7.2 Insert an AT-67 Extension Rod down the inside diameter of the probe rods. Hold onto it and place an AT-68 Extension Rod Coupler on the top threads of the extension rod (the down-hole end of the leading extension rod should remain uncovered). Attach another extension rod to the coupler and lower the jointed rods down-hole.
- 4.7.3 Couple additional extension rods together in the same fashion as in Step 2. Use the same number of extension rods as there are probe rods in the ground. The leading extension rod must reach the stop-pin at the top of the sampler assembly. When coupling extension rods together, you may opt to use the GW-469 Extension Rod Jig to hold the down-hole extension rods while adding additional rods.
- 4.7.4 When the leading extension rod has reached the stop-pin down-hole, attach the AT-69 Extension Rod Handle to the top extension rod.
- 4.7.5 Turn the handle **clockwise** (right-handed) until the stop-pin detaches from the threads on the drive head. Pull up lightly on the extension rods during this procedure to check thread engagement.
- 4.7.6 Remove the extension rods and uncouple the sections as each joint is pulled from the hole. The Extension Rod Jig may be used to hold the rod couplers in place as the top extension rods are removed.
- 4.7.7 The stop-pin should be attached to the bottom of the last extension rod upon removal. Inspect it for damage. Once the stop-pin has been removed, the sampler is ready to be re-driven to collect a sample.

4.8 Sample Collection

- 4.8.1 Reposition the Geoprobe® machine over the probe rods, adding an additional probe rod to the tool string if necessary. Make a mark on the probe rod 24 inches above the ground surface (this is the distance the tool string will be advanced).

- 4.8.2 Attach a drive cap to the probe rod and drive the tool string and sampler another 24 inches. Use of the Geoprobe®'s hammer function during sample collection may increase the sample recovery in certain formations. Do not over-drive the sampler.

4.9 Retrieval

- 4.9.1 Remove the drive cap on the top probe rod and attach an AT-12B Pull Cap. Lower the probe shell and close the hammer latch over the pull ap.
- 4.9.2 With the Geoprobe® foot firmly on the ground, pull the tool string out of the hole. Stop when the top (drive head) of the sampler is about 12 inches above the ground surface.
- 4.9.3 Because the piston tip and rod have been displaced inside the sample tube, the piston rod now extends into the 2-foot probe rod section. In loose soils, the 2-foot probe rod and sampler may be recovered as one piece by using the foot control to lift the sampler the remaining distance out of the hole.
- 4.9.4 If excessive resistance is encountered while attempting to lift the sampler and probe rod out of the hole using the foot control, unscrew the drive head from the sampler and remove it with the probe rod, the piston rod, and the piston tip. Replace the drive head onto the sampler and attach a pull cap to it. Lower the probe shell and close the hammer latch over the pull cap and pull the sampler the remaining distance out of the hole with the probe machine foot firmly on the ground.

4.10 Sample Recovery

- 4.10.1 Detach the 2-foot probe rod if it has not been done previously.
- 4.10.2 Unscrew the cutting shoe using the AT-669 LB Cutting Shoe Wrench, if necessary. Pull the cutting shoe out with the liner attached. If the liner doesn't slide out readily with the cutting shoe, take off the drive head and push down on the side wall of the liner. The liner and sample should slide out easily.

4.11 Core Liner Capping

- 4.11.1 The ends of the liners can be capped off using the AT-641 Vinyl End Cap for further storage or transportation. A black end cap should be used at the

bottom (down end) of the sample core and a red end cap at the top (up end) of the core.

- 4.11.2 On brass, stainless steel, and Teflon® liners, cover the end of the sample tube with AT-640T Teflon® Tape before placing the end caps on the liner. The tape should be smoothed out and pressed over the end of the soil core so as to minimize headspace. However, care should be taken not to stretch and, therefore, thin the Teflon® tape.

4.12 Sample Removal

- 4.12.1 Large Bore Clear Plastic and Teflon® Liners can be slit open easily with a utility knife for the samples to be analyzed or placed in appropriate containers.
- 4.12.2 Large Bore Brass and Stainless Steel liners separate into four 6-inch sections. The AT-659K Large Bore Manual Extruder may be used to push the soil cores out of the liner sections for analysis or for transfer to other containers.
- 4.12.3 The procedures for collection of soil samples for chemical analysis are described in the *Standard Operating Procedure for Soil Sampling*.
- 4.12.4 Soil samples collected for archive purposes shall be placed into 4-ounce clear soil jars and labeled with boring numbers, depth, and commission number.

4.13 Equipment Decontamination and Cleaning

- 4.13.1 Prior to conducting a boring, the LEA representative will ensure that all necessary equipment is clean and decontaminated, including the rig, all augers and probing equipment, samplers, brushes, and any other tools or equipment. Decontamination procedures may vary slightly from those presented below, dependent upon the particular types of contaminants encountered.
- 4.13.2 A section of 5-mil (minimum) plastic sheeting shall be cut of sufficient size to underlie the decontamination area to contain any discharge of decontamination solutions.
- 4.13.3 The following solutions shall be prepared and placed in 500-ml laboratory squirt bottles: methanol solution (less than 10%); 10% nitric acid solution; 100% hexane solution; and distilled deionized (DI) water. A fifth solution of phosphate-free detergent and tap water (approximately 2.5 gallons) shall

be prepared in a five-gallon bucket. Only those solutions required for site-specific conditions will be used at a given site, as specified in the site-specific work plan.

4.13.4 All loose debris shall be removed from the augers and spatulas into an empty 5-gallon bucket or plastic sheeting using a stiff bristled brush.

4.13.5 The order of decontamination solutions is as follows:

- 1) Detergent Scrub
- 2) DI Water Rinse
- 3) Hexane Rinse
- 4) DI Water Rinse
- 5) 10% Nitric Acid Rinse
- 6) DI Water Rinse
- 7) Methanol Rinse (<10% solution)
- 8) Air Dry

4.13.6 Each piece of decontaminated sampling equipment will be wrapped in aluminum foil to maintain cleanliness.

4.13.7 An alternative to the procedure described above requires that the equipment be cleaned using a high-pressure wash and steam cleaning in an area constructed to contain spent decontamination fluid and debris (plastic sheeting bermed with timber is usually sufficient). Alternative methods of cleaning may be more appropriate for an individual piece of equipment for site conditions based upon a knowledge of site contaminants, and may be used at the discretion of the LEA representative. Section 5.4 provides additional information on management of potentially contaminated fluids and materials.

4.13.8 At the end of the project day, all used equipment shall be decontaminated. All spent decontamination solutions will be handled and disposed of in accordance with all applicable municipal, state and federal regulations.

4.14 VOC Monitoring

4.14.1 A portable volatile organic compound (VOC) analyzer shall be available on site and shall be used to screen all cuttings and fluids (if any) removed from the hole.

- 4.14.2 Since, in general, it cannot be presumed that there is no contamination at a given site, all cuttings and/or fluids which show a reading on the VOC analyzer that is above background shall be containerized or drummed, as appropriate, on site. Additional information on management of potentially contaminated fluids and materials is presented in Section 5.4.

5.0 Sample Collection and Documentation

5.1 Sample collection following removal from borehole.

- 5.1.1 The sample tube shall be opened by the LEA representative and immediately scanned using the VOC analyzer using the approach described in Section 5.2.
- 5.1.2 The LEA representative will record on the boring log at a minimum: description of the material in the sampler, depth, VOC analyzer reading, material size gradation using the Burmeister system, color, moisture, and relative density.
- 5.1.3 Prior to reuse, the sampler shall be decontaminated using the procedures described in Section 4.13.
- 5.1.4 Soil samples collected for archival purposes shall be placed into 4-ounce clear soil jars and labeled with the boring number, depth, and commission number.
- 5.1.5 The procedures for collection of soil samples for chemical analysis are described in the *Standard Operating Procedure for Soil Sampling*.

5.2 Field Analysis

- 5.2.1 The following procedure shall be used to obtain readings of the VOCs present in a soil sample:
- 1) Obtain an aliquot of soil (approximately 50 grams) from the split spoon and placed into a Ziploc™ plastic bag or equivalent and sealed.
 - 2) Agitate the sample, assuring that all soil aggregates are broken, for two minutes.
 - 3) Carefully break the seal of the bag enough to insert the VOC probe.

- 4) Record the maximum reading obtained on the appropriate forms, as described in Section 5.3.

5.3 Field Documentation

5.3.1 The following general information shall be recorded in the field log book:

- Site identification
- LEA commission number
- Site location
- Name of recorder
- Identification of borings
- Collection method
- Date and time of collection
- Types of sample containers used, sample identification numbers and QA/QC sample identification
- Field analysis method(s)
- Field observations on sampling event
- Name of collector
- Climatic conditions, including air temperature
- Chronological events of the day
- QA/QC data
- Name of drilling firm
- Location of boring on site insufficient detail to relocate boring at a future time (include sketch)

5.3.2 The following information shall be recorded on the boring log:

- Project name, location, and LEA commission number
- Borehole number, borehole diameter, boring location, drilling method, contractor, groundwater observations, logger's name and date
- Depth below grade, sample I.D. number, duplicate numbers, VOC analyzer reading, rig behavior (i.e. drilling effort, etc.)
- A complete sample description, including as a minimum: depth, material size gradation using the Burmeister system, color, moisture, and density. Should a well be constructed in a borehole, a complete well schematic shall be drawn and accurately labeled
- Use of water, including source(s) and quantity

5.3.3 The following information shall be recorded on the Field Quality Review Checklist:

- Reviewer's name, date, and LEA commission number
- Review of all necessary site activities and field forms
- Statement of corrective actions for deficiencies

5.3.4 The Field Instrument & Quality Assurance Record shall include the following information:

- Client's name, location, LEA commission number, date
- Instrument make, model, and type
- Calibration readings
- Calibration/filtration lot numbers
- Field personnel and signature

5.4 Disposal of Potentially Contaminated Materials

Potentially contaminated cuttings or fluids, as indicated by knowledge of the site, discoloration, VOC analyzer readings, or other evidence, shall be containerized on-site pending sampling and determination of hazardous waste status.

5.5 Refusal

Refusal is defined as failure to penetrate the subsurface materials to any greater depth using the maximum reasonable pressure limits of the Geoprobe® machine.

5.6 Bedrock

The term "bedrock" will not be used in a boring log or other description of subsurface materials that have been collected using the Geoprobe® machine, since a confirmational core cannot be collected.

5.7 Boring Abandonment

5.7.1 If the boring is not to be used for other purposes (i.e. monitoring well, soil vapor probe, soil vapor extraction well, etc.) it shall be abandoned.

5.7.2 The boring shall be filled and sealed with neat cement grout or high density bentonite clay grout as soon as the tools are withdrawn from the borehole.

5.7.3 Excess cuttings shall be containerized and sampled before disposal.

5.7.4 In paved areas, the upper three feet of the borehole shall be filled, up to two inches below the existing grade, with sand to allow for repairing of the pavement.

5.7.5 Pavement shall be repaired using cold patch asphalt filler or concrete.

6.0 Other

Depending on the specific site, other considerations may be applicable. Consult the OSHA regulations, applicable RCRA or CERCLA regulations, and the site-specific work plan for details.

7.0 References

Geoprobe® Systems, August 1993, "1993-04 Equipment and Tools Catalog".

APPENDIX F

Field Forms



LEA Comm. No.: 0000100.

Page ____ of ____

Project: General Overhead

Date: ____/____/____

Location: Loureiro Engineering AGen

Inspectors: _____

Client: Loureiro Engineering Associates, PC

Inspection Time: _____

Non-Productive Time

Comments

- ☐ Weather _____
- ☐ Equipment Breakdown _____
- ☐ Missing Equipment _____
- ☐ Late _____
- ☐ Other _____

Weather

Site Activity

- ☐ Sampling Type _____ Number _____ Number of Bottles _____ Method _____
- ☐ Surveying
- ☐ Well Drilling Type _____ Feet _____ Well Installed? ☐ Yes ☐ No
- ☐ Observation Brief Description _____
- ☐ Construction Supervision Brief Description _____
- ☐ Other Brief Description _____

Status of Total Production

Item	Number of Samples			Sample Records		Sampling Days	
	Today	Total to Date	% Complete	Number of Forms	% Complete	To Date	Remaining
Total							

Field Personnel

Entered in MIS ☐

Signature: _____

LEA Comm. No.: 0000100.

Project: General Overhead

Location: Loureiro Engineering AGen

Client: Loureiro Engineering Associates, PC

Page _____ of _____

Date: ____/____/____

Inspectors: _____

Inspection Time: _____

Description of Site Activities

Signature: _____

LEA

Date: / /

[illegible]

Groundwater Samples must be accompanied by Form fedrgl.rpt

Field Personnel:

Signature: _____



LEA Comm. No.: 0000100.

Page _____ of _____

Project: General Overhead

Date: ____/____/____

Location: Loureiro Engineering AGen

Logged By: _____

Client: Loureiro Engineering Associates, PC

Drilling Contractor: _____

Drill Foreman: _____

Drilling Method: _____

Drill Rig: _____

Sampling Method: _____

Groundwater: Depth: _____ at: _____

Depth: _____ at: _____

Elevation/ Depth	Sample Information			Sample Description	PID/FID (ppm)
	Sample Number	Recovery %	Blows/6" / Downforce	Burmeister (Color, primary grain size, other grain size(s), moisture, density, coherence, sed. structure, sorting, other characteristics)	
0					
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					
22					

Comments

Signature: _____



LEA Comm. No.: 0000100.

Page ____ of ____

Project: General Overhead

Date: ____/____/____

Location: Loureiro Engineering AGen

Client: Loureiro Engineering Associates, PC

Field Instrumentation Calibration Data

Instrument Type/I.D. #	Use	Temp. Comp.	Calibration Information	
			Buffers Used/Meter Value	Conductivity Readings
_____	<input type="checkbox"/> pH	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> pH 4	Meter Value Dry _____
	<input type="checkbox"/> Temperature		<input type="checkbox"/> pH 7	Standard Value _____
	<input type="checkbox"/> Conductivity		<input type="checkbox"/> pH 10	Meter Value _____

Comments: _____

_____	<input type="checkbox"/> pH	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> pH 4	Meter Value Dry _____
	<input type="checkbox"/> Temperature		<input type="checkbox"/> pH 7	Standard Value _____
	<input type="checkbox"/> Conductivity		<input type="checkbox"/> pH 10	Meter Value _____

Comments: _____

_____	<input type="checkbox"/> PID (VOC Analyzer)	<input type="checkbox"/> Zero w/ Background	Span Gas Value _____
	<input type="checkbox"/> FID (VOC Analyzer)	<input type="checkbox"/> Zero w/ Air	Meter Value _____

Comments: _____

Calibration Description: _____

Comments: _____

Fluids/Materials Record

Water: Type: _____ Source: _____

Decon:

Lot No:

Lot No:

Alco-Nox

20% Nitric

>20% Methanol

Other

Field Personnel: _____

Signature: _____



LEA Comm. No.: 0000100.

Page _____ of _____

Project: General Overhead

Date: ____/____/____

Location: Loureiro Engineering AGen

Client: Loureiro Engineering Associates, PC

	Yes	No	Corrective Action Taken/Comment:
Sample Labels Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Seals Used?	<input type="checkbox"/>	<input type="checkbox"/>	
Field Log Book Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
All Planned Samples Obtained?	<input type="checkbox"/>	<input type="checkbox"/>	
All Chain of Custody Forms Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
Monitoring Well Physical Data Forms Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
Field Sample Record Forms Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
Daily Field Report Form Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
Field Instrument & Quality Assurance Record Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
Field Data Record - Groundwater From Complete	<input type="checkbox"/>	<input type="checkbox"/>	
All Field Generated QA/QC Samples Collected?	<input type="checkbox"/>	<input type="checkbox"/>	
Final Site Walkover Complete?	<input type="checkbox"/>	<input type="checkbox"/>	
Field Quality Review Checklist Complete?	<input type="checkbox"/>	<input type="checkbox"/>	

Comments

Field Personnel:

Signature: _____